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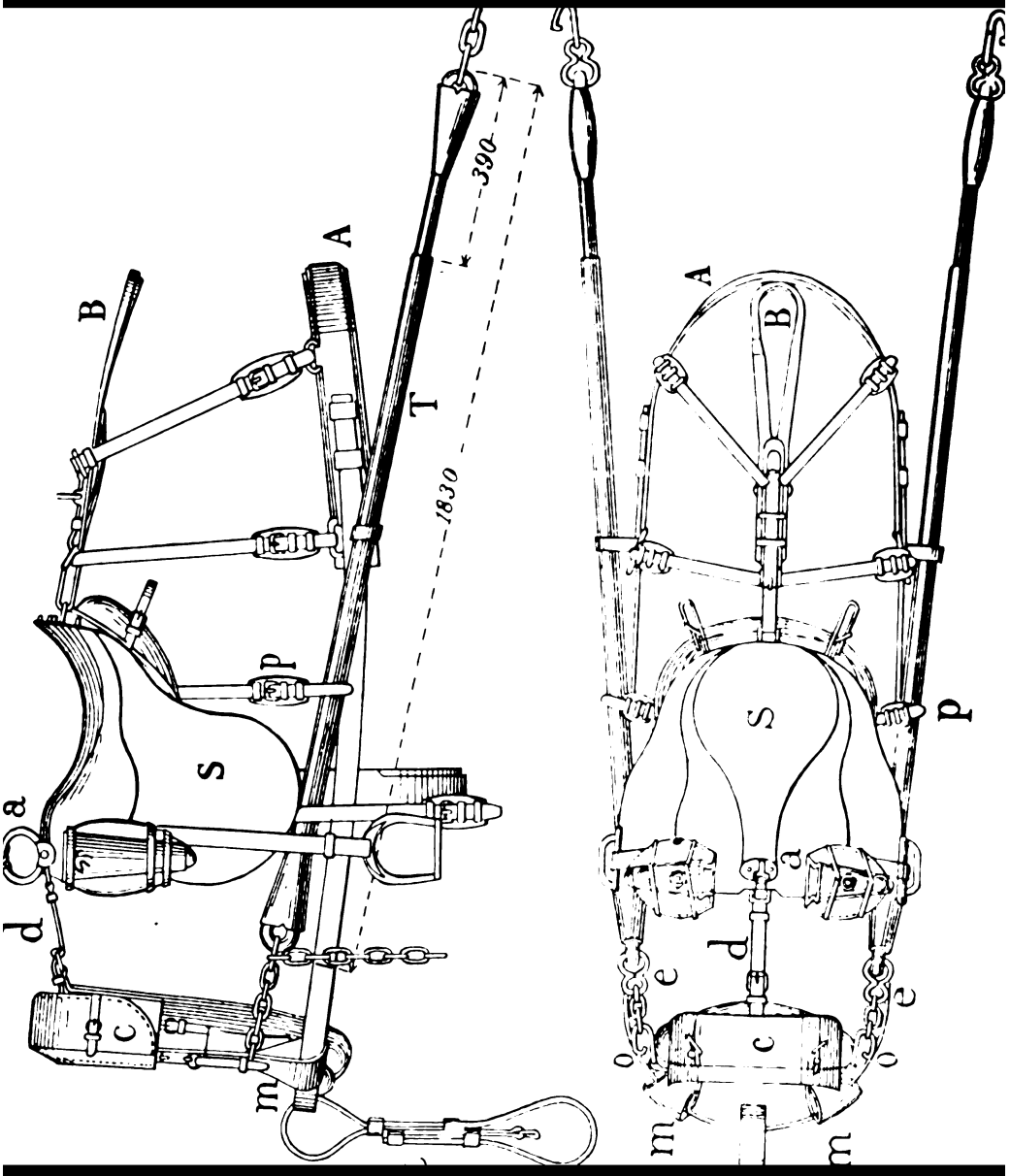

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MATÉRIEL

OF THE

SPANISH FIELD AND MOUNTAIN ARTILLERY.

By C. BENOIT, Captain of Artillery.

FROM THE REVUE D'ARTILLERIE, JANUARY, FEBRUARY, APRIL, AND JULY, 1897.

Translated by
First Lieut. HENRY A. REED, Second U. S. Artillery.

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MATÉRIEL OF THE SPANISH FIELD AND MOUNTAIN ARTILLERY.

A royal order, dated April 20, 1893, prescribed a list of the guns which, from that date, should be "regulation" in the Spanish artillery.

As to the pieces sufficiently mobile to accompany the armies in their various field operations, this list comprises—

a. Four field guns, viz:

(1) One of compressed bronze, caliber 8.7 centimeters, designated by the abbreviation C. BC. 9 c.

(2) One of steel, caliber 8.7 centimeters, Krupp system, designated by the abbreviation C. Ac. 9 c.

(3) One of compressed bronze, caliber 7.8 centimeters, designated by the abbreviation C. BC. 8 c.

(4) One of steel, caliber 7.8 centimeters, model Sotomayor, designated by the abbreviation C. Ac. 8 c., Sotomayor.

b. A mountain gun of steel, caliber 7.8 centimeters, Plasencia system, designated by the abbreviation C. Ac. 8 c. Cr.

c. Two pieces suited to permanent works, siege or field use, viz:

(1) A mortar of compressed bronze, caliber 8.7 centimeters, Mata system, designated by the abbreviation Mr. BC. 9 c.

(2) A shell gun of compressed bronze, caliber 12 centimeters, designated by the abbreviation O. BC. 12 c.

Since the promulgation of this order, the changes effected are as follows:

(1) The shell gun of 12 c., which was still in an experimental stage in 1893, appears to have been discarded on account of its too great weight and replaced, for curved field fire, by the 15-c. mortar of compressed bronze, Mata system, designated by the abbreviation Mr. BC. 15 c.

(2) A field gun, caliber 75 millimeters, Krupp system, has been recently adopted for use by the Cuban Expeditionary Corps.

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In addition to this, the two following notes are pertinent:

(1) The 8.7-centimeter mortar, Mata system, is more particularly suited to mountain service; in fact it is constructed entirely with a view to its transportation on the backs of mules.

(2) The drill regulations, edition of 1894, and the manual of field artillery fire, edition of 1895, refer to a steel gun of 7.8 centimeters caliber, Krupp system modified. It is designated by the abbreviation C. Ac. 8 c. R.

The object of this essay is to give a brief description of these different guns and of the matériel pertaining to them. When permissible, preference has been given to the Mata and Sotomayor matériel as the most modern. The latter is now the subject of investigation with a view to a possible change in the field artillery armament.*

The principal works consulted are:

Prontuarío de artillería, by D. Estanislao Guiu y Martí; Madrid, M. Tello, 1881.

Reglamento para la instrucción táctica de las tropas de artillería, official; Madrid, Artillery Corps editions, 1891–1894.

Die Feld- und Gebirg-Artillerie der Europäischen Staaten im Jahre 1890, by Captain Schubert; Vienna, Seidel and Son, 1890. (French translation by Captain Bodenhorst, Belgian artillery; Paris, Berger Levrault et C^{ie}, 1892.)

Libro de memorias del oficial de artillería, by D. Juan de Ugarte; Saint Sebastian, Imprimerie de "la Voz de Guipúzcoa," 1894.

Instrucciones para el tiro de las baterías de campaña, official, July 13, 1895; Madrid, Artillery Corps edition.

FIELD MATÉRIEL.

Whatever may be the pattern of matériel used, every Spanish field battery includes, in addition to its pieces and caissons, section carriages (carros de sección) and Catalonian carts.

* It appears from an article published by the "Memorial de Artillería," November, 1896, entitled "Extract from a report of the commission d' experiences on the subject of rapid-fire guns," that Colonel Sotomayor has recently presented a new pattern of field gun which seems to have given very satisfactory results, notably in regard to power and rapidity of fire. This report recommends placing it on trial concurrently with the models proposed by Krupp, Saint-Chamond, and Maxim-Nordenfelt, and with Sotomayor's new field matériel as well as the Ordoñez mountain matériel, mentioned in "La Revue," November, 1895, page 198.

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Batteries of Sotomayor guns are furnished besides with a spare carriage.

ORDNANCE.

9-c. steel gun (*C. Ac. 9 c.*).—This is of the Krupp system called the model of 1875. Fig. 3, pl. 1, gives a general view of this gun with its principal dimensions. It is of cast steel, with trunnion jacket; caliber, 87 millimeters between lands; weight, 487 kilograms.

Its twenty-four grooves have not a uniform twist; their inclination is 3° 59′ 10″, and their cross section is given in fig. 2, pl. 1.

The breechblock is a cylindro-prismatic wedge (fig. 5, pl. 1), similar to that of the heavy field gun, model 1873, German artillery. Obturation is effected by the Broadwell ring.

A vent plug is screwed into the breechblock, its extremity entering a mortise of the wedge. Ignition is produced through an oblique canal which traverses the wedge and the vent plug and extends to the middle point of the obturator plate.

The vent plug also serves to limit the lateral movement of the wedge and when unscrewed the wedge can be removed.

The compressed bronze gun of 9 c. (*C. BC. 9 c.*).*—This is constructed on the model of the Krupp gun, and is known as the model of 1878. It is of compressed bronze, with a steel ring; its caliber and rifling are the same as for the steel gun. It weighs 516 kilograms.

The breechblock is a prismatic steel wedge. Obturation is effected by a plate and a ring, both of copper.

The vent is bored above the chamber and perpendicularly to the axis of the gun; the vent plug, of copper, is swaged (maté) into its receptacle and does not extend to the chamber.

The lateral movement of the wedge is limited by a stop similar to the breech bolt (verrou de culasse) of the German field guns, model 1873–1891. This stop is held in place by a spiral spring, permitting of vertical displacement. To disengage the wedge from the stop it is only necessary to lift the stop by means of a terminal button.

The sight groove is vertical and is arranged in a block attached to the breech.

8-c. compressed bronze gun (*C. BC. 8 c.*).†—This gun is

*See Revue d'Artillerie, vol. 13, December, 1878, p. 235: "The new Spanish 9-c. compressed bronze gun."

†See Revue d'Artillerie, vol. 17, January, 1881, p. 382: "Spain—The light guns of the field artillery."

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known as the model of 1880. In its construction, breechblock mechanism, and system of obturation it resembles the 9-c. bronze gun. Fig. 9, pl. 1, gives a general view of the gun as well as its principal dimensions.

Its caliber is 78.5 millimeters between lands; its weight 358 kilograms. It has twenty-four grooves, shown in section in fig. 12, pl. 1; the twist is uniformly increasing from 60 to 30 calibers.

8-c. modified steel gun (*C. Ac. 8 c. Rf.*).*—This gun is remodeled from the 8-c. steel Krupp gun, model 1868. Fig. 10, pl. 1, gives the principal dimensions.

The most important change consists in the addition of a number of hoops. This number, which was five at first, has been reduced to three in the guns of latest construction; the anterior hoop is 94 millimeters long, the trunnion hoop 144 millimeters, and the breech hoop 412 millimeters. Its caliber is 78.5 millimeters between lands; length, 1.935 meters; weight, 338 kilograms. It has twelve grooves with uniform twist.

The breechblock is a cylindro-prismatic wedge (fig. 4, pl. 1); the lateral movement of the block is limited by a screw stop which engages in a mortise in the upper part of the breech (*e*, fig. 10).

Obturation is effected by a plate and a ring, as heretofore described. The vent plug, adjusted in place, passes through the breech hoop and the tube.

8-c. steel gun, Sotomayor system (*C. Ac. 8 c. Sotomayor*).—The Revue has given a description of the 8-c. gun produced by Captain Sotomayor and a résumé of the trials which preceded its adoption.† A preliminary pattern, known as model 1880, was used in the service, but subsequent experiments have resulted in the adoption of a more powerful type called the model of 1891.‡

Model of 1880.—This is of steel, and with screw fermeture; caliber, 78.5 millimeters; length, 2.212 meters; weight, 285 kilograms.

The accompanying sketch (fig. 1) gives a longitudinal section and the principal dimensions.

*See Revue d'Artillerie, vol. 15, December, 1879, p. 193: "Remodelling of the 8-c. Krupp guns in the Spanish service.

†See Revue d'Artillerie, vol. 20, September, 1892, p. 542: "The new Spanish 8-c. light gun, of cast steel, tested in Spain;" and vol. 21, March, 1883, p. 559: "Résumé of the work of the Superior Consultation Committee of the Spanish Artillery in 1880–81; subject, 8-c. Sotomayor gun," also Plate XX, same volume.

‡Waffenlehre, p. 429.

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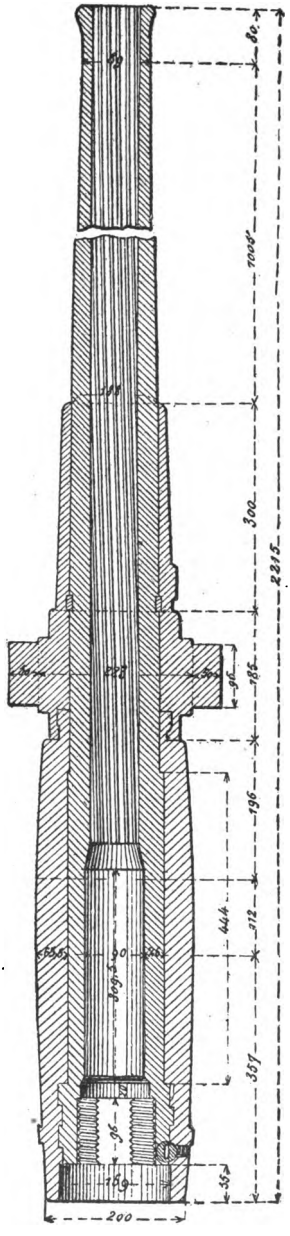

Fig. 1.

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The gun consists of a tube and a series of hoops—a jacket, trunnion hoop, two half hoops (demi-anneaux), and an anterior hoop.

The breech fermeture consists of a carrier ring (volet) movable about a hinge, and a screw. Its manipulation resembles that of the De Bange breech screw.

In the first Sotomayor guns, the Freyre gas check, consisting of a movable head, a spiral spring, and a copper obturator ring, was used, but it has been displaced by the Piorkowski gas check, which is now the regulation pattern.*

The rifling is from left to right, parabolical, with parallel lands; twist increases from 50 to 22 calibers.

The chamber, crudely represented in the sketch, is of greater diameter than the bore and the gas-check seat; it is connected with them by two truncated conical surfaces; the projectile enters (or projects partly into) the rifling.

Ignition is central; the vent, of copper, is in the axis of the breechblock.

The following nomenclature of the gun is given in the regulations of 1894, for tactical instruction of the artillery troops (Vol. II—Service of the piece for field batteries):

"The exterior of the gun consists of three parts.

"The first part comprises the breech with its reenforcement, loading cavity, sighting attachment, hinge ears, pointing level seat, and a support used to connect the gun with its pointing apparatus.

"The second part includes the trunnion hoop with its trunnions and rimbases. The trunnions have a projection on which the sight vane cover is placed.

"The third part comprises the chase hoop with its sight vane seat, the chase, the 'swell of the muzzle' with its fillet, and the muzzle.

"Inside the gun, we have the carrier ring seat with the bolt catch (gâche du verrou) and a mortise for the stop, the thread of the breech with its three filled and three slotted sectors, the obturator seat, the cartridge and projectile chambers, and the bore with its sixteen grooves.

"The breechblock has three threaded and three slotted sectors; it has in front, the obturator; in rear, a disk furnished with a handle which is used to move the breech, a vent cover,

†See Revue d'Artillerie, vol. 21, Plate XIX.

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a hook to hold the primers, a guide groove in the lower slotted sector, and an axial vent.

"The obturator consists of a plate and a ring. The plate is of steel in the shape of a truncated cône; its smaller base is provided with a tenon which engages in a threaded cavity of the fermeture screw where it is rigidly held; the larger base contains the inner orifice of the vent with its hexagonal nut. The ring, also of steel, has its inner surface truncated and of an inclination to correspond with the plate."

The motions of opening and closing the breech (fig. 2) are as follows:

To open the breech.—The first gunner on the left (presumably No. 2) seizes the handle with his right hand, fingers below, thumb above, and turns the handle toward him, causing the block to revolve until at the end of the movement the end of the handle is at its highest point; then, with the same hand, he seizes the vent cover and pulling gently causes the block to turn on its hinges.

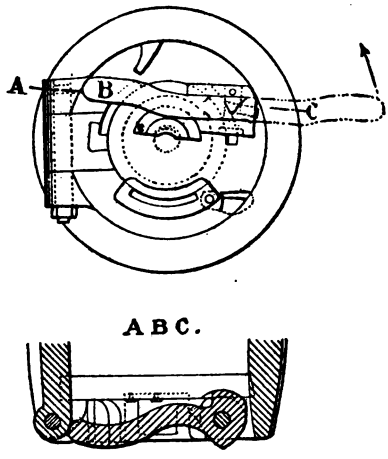

Fig. 2.

To close the breech.—The same gunner as above, with his right hand assures the junction of the breechblock with its carrier, so that they shall not be disengaged, to effect which he places his fingers extended on the obturator plate, thumb on the outer surface of the carrier; then seizing the vent cover with his left hand, swings the block into position, keeping his hands as indicated until he is obliged to withdraw the right to permit the block to enter the breech; he then pushes the block in gently; then, with his right hand, palm down, on the handle, he turns the block 90 degrees, and finally lets go the handle, taking care that the bolt is secure in its socket.

To load the piece, use is made of a loading tube carried in one of the chests. When the breech is opened, No. 2, holding the tube by its handles, the opening uppermost and slightly inclined to the left, introduces it into the breech, turning it

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gently so that the ribs engage in the corresponding grooves. When the piece is loaded, No. 2 removes the tube and places it on the carriage, and resumes it when he has closed the breech. Before closing the breech he makes sure that the obturator turns freely in each direction.

Model of 1891. — A description of the Sotomayor gun, model 1891, has not been published. Accepted in 1891 for experimental purposes, this gun does not appear in the list of regulation pieces of 1893; it was not then in service, and, considering that the experiments having in view a change of armament may continue, we are led to believe that it never will be adopted. Its caliber is the same as that of model 1880; its length is 2.5 meters, about 32.9 caliber; its weight, 350 kilograms. It is noticeably superior to the first pattern, and information concerning it will be given later.

The following table contains the most important data relating to the guns of the Spanish field artillery:

TABLE NO. 1.—NUMERICAL DATA—GUNS.

Nature of data.	GUNS OF 9 CM.		GUNS OF 8 CM.			
	Steel.	Compressed bronze.	Compressed bronze.	Steel, modified.	Sotomayor system.	
					Model 1880.	Model 1891.
Diameter of bore between lands, millimeters	87	87	78.5	78.5	78.5	78.5
Weight of gun, including breech mechanism, kilograms	487	516	358	338	285	350
Weight of breech mechanism, do	29	30	26	29	8.3	11.5
Length:						
Of the piece, millimeters	2,100	2,060	2,021	1,935.4	2,212	2,580
Of the piece, calibers	24.1	23.7	25.8	21.6	28.2	32.9
Of the bore, millimeters	1,875	1,880	1,854	1,728.8	2,041	2,394
Of the bore, calibers	21.5	21.6	23.6	22	26	30.5
Of the rifled part, millimeters	1,506	1,506.3	1,593	1,485.2	1,700	2,212
Of the rifled part, calibers	17.3	17.3	19.1	18.9	21.6	28.1
Volume of the chamber, cubic centimeters	1,870	1,988.99	1,569.133	1,183.5	1,990	———
Twist	Uniform.	Uniform.	Increasing.	Uniform.	Increasing.	———
Grooves:						
Number	24	24	24	12	16	———
Depth	1.25	1.25	1.25	1.25	10.5	———
Breadth	8.4	8.4	7.47	17.9	10.5	———
Distance between front and rear sights, millimeters	1,000	1,049	1,009	808.4	1,000	———
Breech preponderance, kilograms	46	42	40	37.7	23	———

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CARRIAGES.

Three carriages are in service:

(1) Model 1877, for 9-c. gun.

(2) Model 1880, for 8-c. gun.

(3) One for the 8-c. gun, Sotomayor system.

Model 1877 for 9-c. guns.—This is of steel, and is shown in fig. 1, pl. 1.

The flasks, of 10-millimeter steel plate, are parallel in front and converging (the trail part) to the rear.

The axle is of cast steel; two oblique braces secure it firmly to the flasks. The wheels have metallic nave boxes. There are two axle seats. A shoe, suspended on left of carriage, is used for a drag.

The pointing lever when not in use is folded back between the flasks. When the piece is in battery, the lever rests in a stirrup, where it is secured by a cross key, or bolt, attached by a small chain to the lunette.

The pointing apparatus comprises—

(1) An elevating screw, which is manipulated by a wheel handle, its lower extremity engaging in a nut attached to the flasks.

(2) Two braces secured by bolts to the flasks and to the head of the screw.

Weight of carriage empty, 570 kilograms; fully equipped with piece, equipments, and accessories, 1,098 kilograms.

Model of 1880 for 8-c. guns.—Of steel, and is shown in fig. 2, pl. 1. It differs from model 1877, as follows:

The flask plates are 7 millimeters thick. The axle is attached to the flask by two side straps, the rear extremities of which are secured to an intervening rubber cushion which rests upon a transom; this arrangement permits of a slight longitudinal displacement to the rear in firing, thus lessening the shock of discharge; and, for a like object, elastic cushions are introduced between the carriage seat, axle, and corresponding strap.

A transverse spur (or projection beneath the trail plate) helps to diminish the recoil.

The pointing apparatus comprises—

(1) A rachet arc movable about two pins attached to the flask and on which the breech rests.

(2) A corresponding rachet pinion manipulated by an endless screw having a wheel handle.

A small chest is arranged between the flasks to hold various implements.

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Its weight, empty, is 410 kilograms; fully equipped, with piece, implements, and accessories, 760 kilograms.

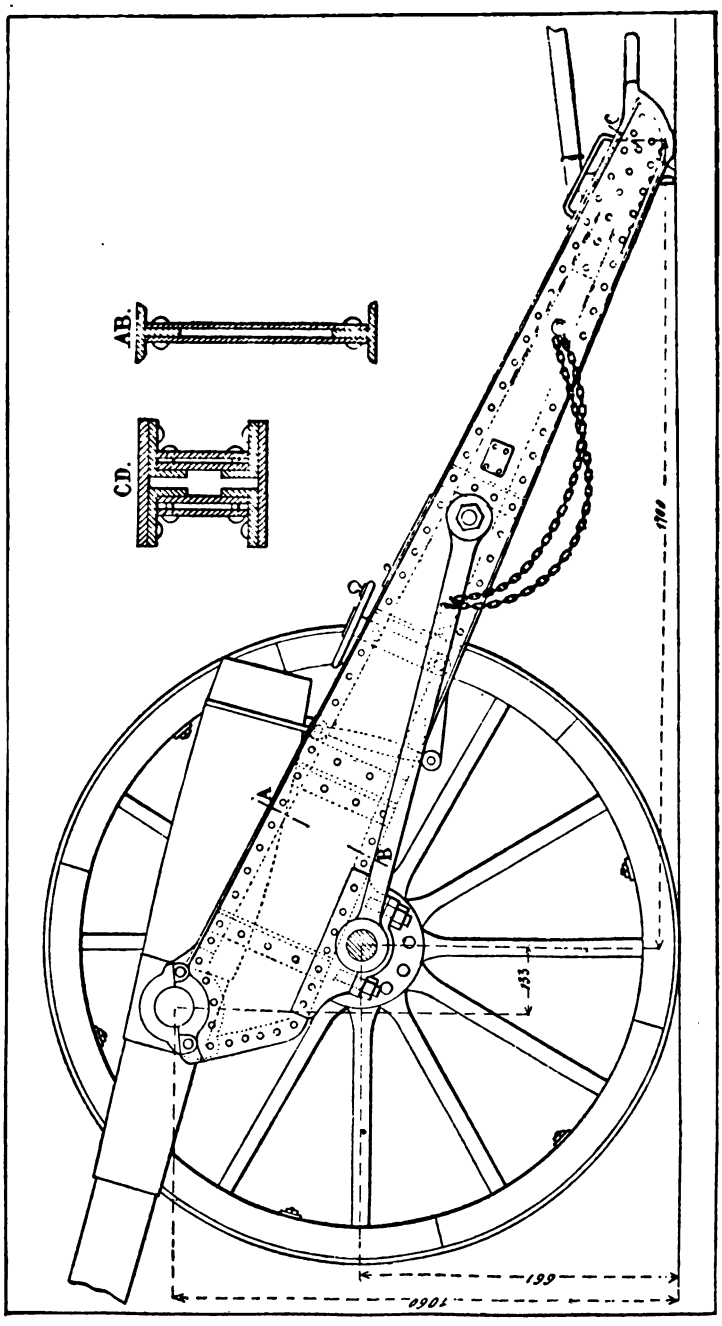

Fig. 8.—Carriage for the 8-c. gun, Sotomayor system.

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Carriage for the 8-c. gun, Sotomayor model.—This is shown in fig. 3. It is of steel with converging flasks of steel plate 3.5 millimeters thick, flanged, and joined by five transoms. *AB* and *CD* give sections of a flask near the head of the carriage and of the trail near the lunette, respectively.

The naves are of steel.

The pointing lever, of iron, is articulated and has two positions—traveling and firing. It is held in each of these positions by a key which engages correspondingly in the lever and in a support fixed to the upper surface of the trail plate.

The pointing apparatus comprises—

(1) An articulated motion rod, on the one hand, for the support of the breech; and, on the other, two vertical bridles separated by a screw nut.

(2) A pointing screw, which turns in this screw nut and is manipulated by a wheel handle.

A small chest is disposed between the flasks.

The carriages of the Sotomayor model, appropriate to mounted batteries, admit of carriage seats; those pertaining to horse batteries do not.

Weight, empty, 287 kilograms; fully equipped, with piece, implements, and accessories, 610 kilograms.

In his "Waffenlehre," General Wille mentions, in conjunction with the Sotomayor gun, model 1891, a special carriage for this gun, which weighs, empty, 455 kilograms, and fully equipped, 816 kilograms.

The spare carriage differs from the one just described only by a special arrangement for facilitating transportation of the spare wheels. This consists of an axle, of which the two spindles occupy the positions of the trunnions of a gun; by means of two uprights resting upon the carriage axle, the latter supports the spare axle to which the spare wheels are attached.

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The following table contains the principal numerical data relating to carriages just described:

TABLE No. 2.—NUMERICAL DATA—CARRIAGES.

Nature of data.	Model 1877.	Model 1880.	Sotomayor system.	
			Model 1880.	Model 1891.
Weight of carriage not equipped ---kilograms---	570	410	287	455
Weight of carriage fully equipped with piece and accessories, kilograms	1,098	760	610	816
Height of trunnion axes ---millimeters---	1,080	950	1,060	1,120
Angle of fire:				
Elevation ---degrees---	26	20	15	15
Depression ---do---	13	5	5	5
Total length of carriage ---millimeters---	2,360	2,300	2,235	-------
Length of carriage from front face of axle to end of trail plate, millimeters	2,130	2,100	1,880	-------
Length of piece in battery from muzzle to end of trail plate, millimeters	3,278	3,250	3,390	-------
Distance from front line of wheels to muzzle of piece, millimeters	478	575	940	-------
Axle:				
Depth ---millimeters---	85	80	95	-------
Length ---do---	1,813	1,650	1,700	-------
Weight ---do---	81	82	71	-------
Wheels:				
Diameter ---do---	1,390	1,322	1,322	1,400
Weight ---kilograms---	92	66	76	83
Track ---millimeters---	1,630	1,400	1,375	-------

LIMBERS.

Each model of carriage has its distinct limber. There are, consequently, three kinds of limbers in service:

(1) The limber, model 1878, modified, for 9-c. guns.

(2) The limber, model 1868, modified in 1880, for 8-c. guns.

(3) The Sotomayor limber.

Model 1878 for 9-c. guns.—This is of iron plate and is shown in fig. 2, pl. 2. The body of the limber is formed of four rails (hounds) of angle iron. The two interior rails converge near their extremities, thus forming, in front, the pole fork, and, in rear, a receptacle for the supporting plate of the pintle.

The wheels, with metallic nave boxes, are similar to those of the corresponding gun carriage, but are furnished with a hub brake, which locks automatically.

The ammunition chest is of steel plate 1.5 millimeters thick; it contains thirty-three projectile compartments, in which the

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projectiles are placed upright; the cartridges are in leather boxes. The primers and fulminates are in two small chests, disposed beneath the ammunition chest, which are opened by lowering the rear panel. The left-hand chest contains only one lanyard, while that on the right contains two.

Two spare chests serve as a footboard.

Model 1868, modified in 1880, for 8-c. guns.—Of wood, and shown in fig. 3, pl. 2. The body of the limber has two rails, and a projecting piece in front for a fork, to which the pole is attached, and one in rear for the pintle.

The wheels have wooden nave boxes.

The ammunition is contained in a chest, the cover of which opens to the front. This chest has four subdivided compartments—one at the bottom for eighteen projectiles, the three others above containing, respectively, eight, eight, and two projectiles.

The cartridges, equal in number to the projectiles, are in zinc compartments, one containing six and the other eight pockets.

The footboard serves as a cover to four small, spare chests.

Limber, Sotomayor system.—Of iron, and represented in fig. 4. The body of this limber has four steel rails, to which a wood platform is attached by four angle irons. Two special fixtures support the pole and pintle.

The axle and wheels are the same as for the carriage.

The projectiles are placed upright in four chests, disposed symmetrically with reference to the axle. The cartridges are in two superposed chests, which form a cover to the other four—one of the former over each two of the latter. All the covers open from rear to front, and are held in place, when open, by iron arcs.

The limber contains fourteen rounds. The two left chests contain, each, nine shrapnel; of those on the right, one contains nine shell, the other six shell and three canister. Each cartridge chest contains eighteen cartridges, arranged in four compartments, superposed two and two.

Between the two cartridge chests is a chest for implements; and, under it, a small chest for fulminates and one for primers. The fulminate chest has eighteen percussion caps in the upper drawer; and, in the lower, twenty percussion caps for time fuses; the latter remaining empty if the shrapnel are used with Krupp fuses. The primers are in packages of fifteen.

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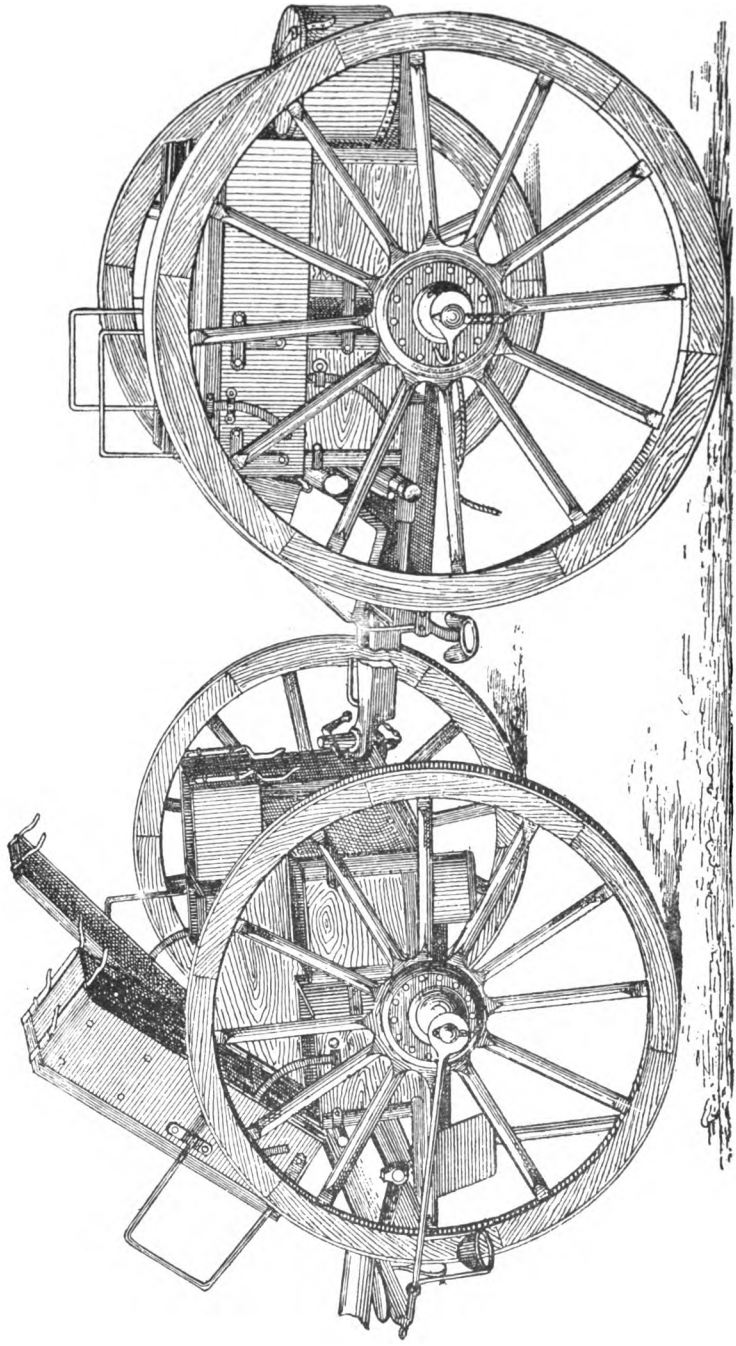

Fig. 4.—Caisson for 8-c. gun, Sotomayor System.

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When ammunition is supplied from the limber, the man charged with its distribution performs the work as follows:

If a shell is desired, he raises the right-hand cover; for shrapnel, the left-hand cover; he opens the corresponding cartridge chest; then the fulminate chest and pulls out the proper drawer; removes the temporary shell cap, which he places on the implement chest; finally he delivers to each ammunition carrier a cartridge, projectile, and primer.

The Sotomayor limber, model 1891, although considerably lighter than the foregoing, also contains thirty-six rounds.

TABLE 3.—NUMERICAL DATA—LIMBERS.

Nature of data.	Model 1878.	Model 1868–80.	Sotomayor system.	
			Model 1880.	Model 1891.
Weight of limber without ammunition or equipment_kilograms_	690	412	647	465
Weight of limber with ammunition and equipment_____do____	1,098	619	930	812
Length of pole _____millimeters_	2,630	2,700	2,750	-------
Ammunition chest:				
Length_____millimeters_	1,083	930	813	-------
Breadth _____do____	593	482	1,114	-------
Height _____do____	261	398	550	-------
Number of rounds carried _____	33	34	36	36

GUN CARRIAGES.

Traction gear—Harnessing.—All the limbers have fixed splinter bars, each furnished with four trace rings; this bar is of wood for the 8-c., of iron for the 9-c., and of steel for the Sotomayor limbers. The pole is of wood, usually of black poplar, reenforced at its extremity by an armature which carries two figure-of-eight links. The wheel horses (or mules) are hitched to the splinter bar; the swing horses to the wheel-horse traces; and the leaders to the traces of the swing horses.

The wheel-horse traces are 1.82 meters long; those of the leaders and swing horses, 2.51 meters.

Each trace has at each end a ring and a figure-of-eight link; at the rear end the latter has a hook attached; the front figure-of-eight link has two short chains attached, one of which has three links; the other chain has nine links in the rear traces and only one in the others.

The Spanish style of hitching is well known. It is described in the "Revue d'artillerie," vol. 48, May, 1896, p. 180. Applied to artillery, it is as follows (figs. 5 and 6):

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The harness has a collar. All the horses have saddles, *S;* the saddle bow is fastened to the collar *C* by a leather strap, *d*, called the "dragon-strap."

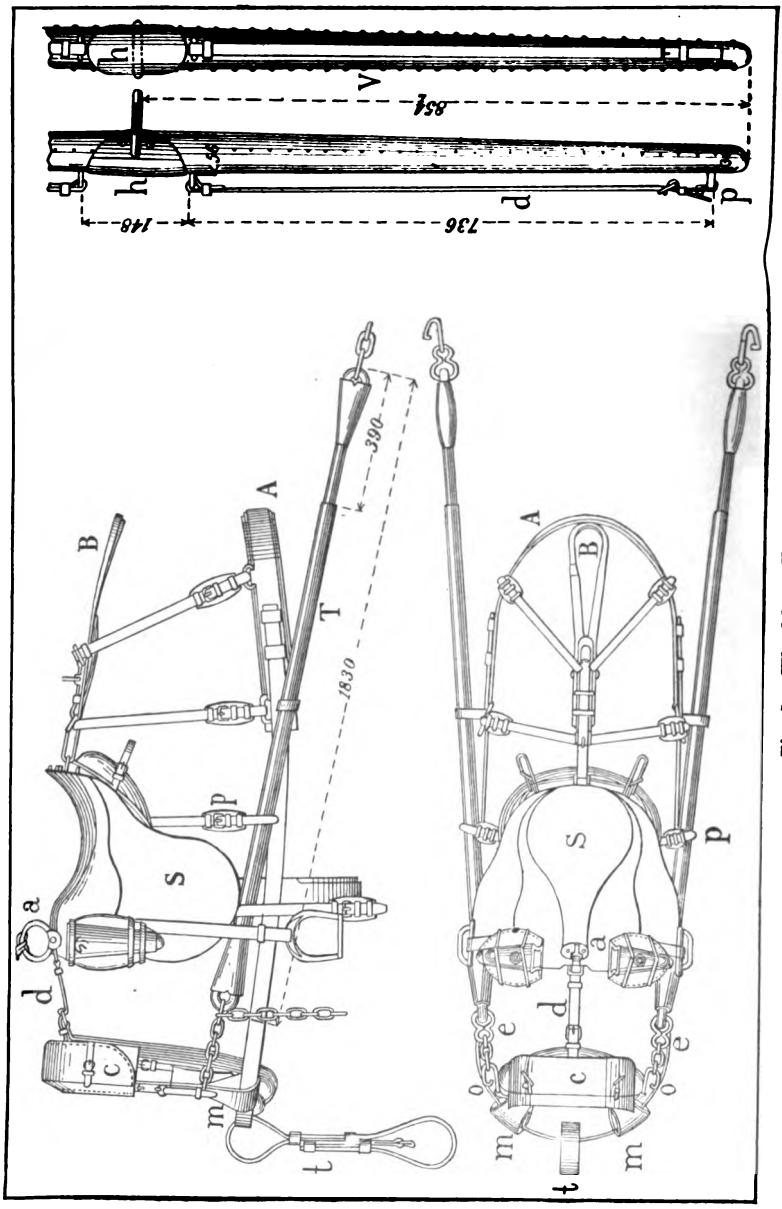

Fig. 5.—Wheel-horse Harness.

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The wheel-horse harness has in addition a pole yoke, *V*, leg-guard, crupper, *B*, breeching, *A*, breast strap, *m*, and a pole strap, *t*.

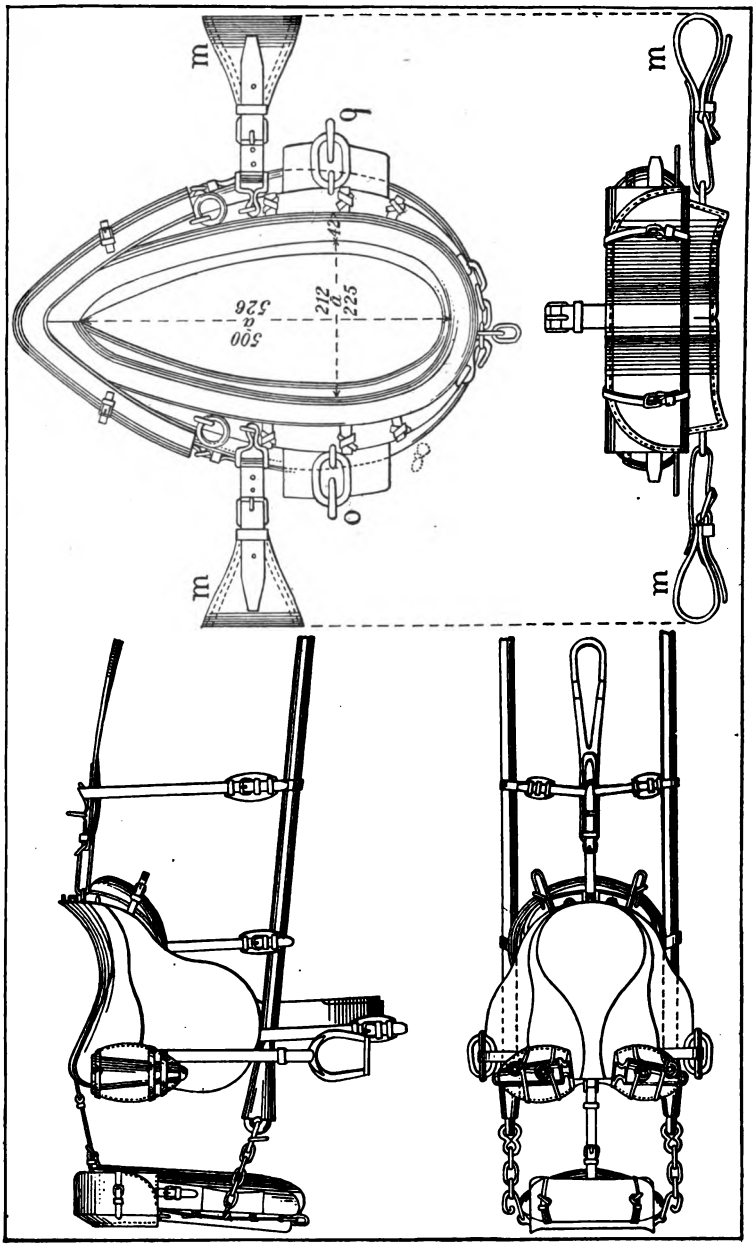

Fig. 6.—Lead and Swing Harness; Collar.

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The pole yoke is a bar, steel studded, having a plate, *h*, at its middle point and four hooks, *p*, between which the two leather supporting straps are held. A leather strap, called "the support," is attached to the plate and is used to hold up the end of the pole. The wheel-horse saddles are furnished with a ring in which one end of the yoke may be engaged.

The collar has two trace hooks, *o*, and two figure-of-eight links; the former serve as attachments for the monk sleeves, which are leather-bound and support the breast strap.

The lead and swing harness are alike, and differ from the wheel harness as follows: They have neither yoke, breeching, nor breast strap, and are consequently without the pole-yoke loop; the crupper has but two trace supports; the traces are longer, and the collar is without sleeves.

To hitch, the wheel driver (tronquista) hooks the first link of the small trace chain to the collar hook *o*, being careful to pass the trace through the supporting strap *F*. He puts the breast strap through the sleeve *m*, and into the pole strap *t*, and buckles the dragon strap. He then rests the yoke across the saddles, engaging it in the rings; attaches the supporting strap, so that its buckle is to the right, and secures the pole straps to the figure-of-eight links so as to leave the buckles uppermost; then, passing to the right, he buckles the pole strap, hitches the off horse and finally does the same for the near horse and the other pole strap.

When the wheel driver has secured the pole straps, the swing driver begins hitching; he hooks his traces to the larger of the wheel-horse trace chains, being careful to pass them above the pole straps.

The wheel drivers begin with the off horse and the others with the near horse; all attach the inner traces first.

The pole straps should be moderately slack and free, and the length of the supporting straps should be such as to keep the top of the limber horizontal.

EQUIPMENT OF GUN CARRIAGES.—In the field, the gun-carriage equipment for all models consists of—

(1) For the gun: 1 muzzle cover and 1 breech cover.*

(2) On the carriage: 1 rammer, 1 bucket, 1 sponge, and 2 pointing levers (including the one fixed to the trail).

*As to the Sotomayor material, when the piece is in battery, these covers are hooked to the cartridge chests and to the implement chest of the caisson.

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(3) On the limber, secured to the chest: seat, cushions, and tools.

The gun carriage for the 8-c. gun has in addition—

(1) On the carriage: 2 seat cushions.

(2) In the right-hand chest: an oiler, a sponge, and cleaning material.

(3) In the left-hand chest: a level, fuse wrench, worm, and besides, for certain carriages, a priming wire and an obturator.

(4) On the limber: 2 handspikes, 1 prolonge.

(5) In the chest: 34 cartridges placed as heretofore described, and 34 projectiles arranged as follows: 2 canister in the right-hand cases of the lower chest; 16 common shell, 8 in the left-hand cases of the lower chest, and 8 in the upper right-hand chest; 16 shrapnel in the remaining cases of the lower, and in the upper left-hand chests.

(6) In the small chests: fulminates and friction primers in excess of ordinary demands.

As to the gun carriage for the 9-c. gun, very similar to the 8-c. carriage just described, the chest contains 15 shrapnel, 15 common shell, and 3 canister.

The Sotomayor gun carriage has—

(1) Underneath: 1 shoe.

(2) In the chest: 1 loading tube, cleaning cloths, sponges, etc.

(3) Traces for the limber.

(4) In the chests: 36 rounds complete, arranged as heretofore described.

(5) In the implement or tool chests: indispensable articles for opening fire.

TABLE 4.—NUMERICAL DATA—GUN CARRIAGES.

Nature of duta.	Matériel of 8 c.	Matériel of 9 c.	Sotomayor matériel.	
			Model 1880.	Model 1891.
Number of gunners that can be carried by the piece:				
On the carriage	2	2	2	2
On the limber	2	2	2	2
Weight of gun carriage completely equipped:				
Without gunners kilogram	1,380	2,108	1,538	1,640
With gunners do	1,660	2,388	1,818	1,920
Number of draft horses	4	6	6	6
Load per horse:				
Piece without gunners kilogram	315	351	256	273
Piece with gunners do	415	398	306	320

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CAISSONS.

Three caissons are in use:

(1) Model of 1868, modified in 1880, for 8-c. gun;
(2) Model of 1878, for 9-c. gun;
(3) Sotomayor model.

The limbers of these caissons are like those of the corresponding pieces and contain the same number of projectiles; but, in the Sotomayor model, canister is substituted for common shell, and the fulminate chest contains twenty percussion caps instead of eighteen.

Model 1878, for 9-c. gun (fig. 1, pl. 2).—The carriage body is of iron; its wheels are like those of the limber; it has a drag shoe and a spare wheel-axle.

The ammunition chest is like that of the limber; it opens from rear to front and contains 40 rounds—25 common shell and 15 shrapnel.

The principal implements making part of the equipment of the 9-c. caisson are one sponge and rammer and a jointed spare pole.

Model 1868, modified in 1880, for 8-c. gun (fig. 3, pl. 2).—The carriage body is of wood, its wheels are like those of the limber, and it has a spare wheel-axle.

The ammunition chest is like that of the limber, it is subdivided to contain 48 projectiles, and has a case for 50 cartridges. The cover opens from rear to front, and is fitted to receive the ogives of the projectiles.

These 48 projectiles comprise 23 shell, 23 shrapnel, and 2 canister, which are arranged as follows:

Left-hand side	Lower case:	10 shell and 2 canister.
	Upper case:	10 shrapnel and 2 shell.
Right-hand side	Lower case:	11 shrapnel and 1 shell.
	Upper case:	10 shell and 2 shrapnel.

Two small chests are under the footboard; the right-hand one contains two boxes of fulminates, and that on the left a box of primers.

The principal implements on the 9-c. carriage are a jointed spare pole, 1 mattock, 1 pick, 1 ax, and 1 shovel.

Sotomayor model (fig. 4).—The carriage body is of steel, its wheels are like those of the gun carriage and it has a drag shoe.

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The projectile chests, cartridge cases, and the small chest for tools are like those of the limber, but the contents of the small chest are different.

The caisson carriage, like the limber, contains 36 rounds—18 shell and 18 shrapnel.

The principal accessories carried by the Sotomayor model are drill traces, 1 sponge and rammer, 1 jointed spare pole, 1 ax, and some picks.

TABLE 5.—NUMERICAL DATA—CAISSONS.

Nature of data.	8-c. caisson.	9-c. caisson.	Sotomayor caisson.
Weight of caisson carriage:			
Empty ---------- kilogram	540	719	685
Fully loaded and equipped ---------- do	776	1,029	----------
Weight of caisson complete ---------- do	1,395	2,039	1,897
Weight of caisson complete with gunners ---------- do	1,675	2,320	2,180
Load per horse:			
Caisson without gunners ---------- do	349	340	316
Caisson with gunners ---------- do	419	386	363

OTHER VEHICLES.

Section cart.—But one model is in use, that of 1863, modified in 1880. It consists of a carriage and limber, has a drag shoe and a semicylindrical wagon cover.

The limber is the 1868 model, modified in 1880; its chest contains, in one box, the battery books; and, in the other, the marking utensils.

The carriage contains two layers of boxes. The first layer comprises two boxes of horseshoes, a carpenter's tool box, a saddler's tool box, a wheelwright's tool box, and two spare boxes. The second layer, five baggage chests and two medicine chests (one for men and the other for horses).

The metal bows of the wagon cover are utilized for stowage of spare articles—splinter bar, yoke, lanterns, torches, shafts, etc.

Empty, its weight is 465 kilograms; loaded and equipped, 1,032 kilograms.

Catalonian Carts.—Only one model is in use, that of 1873. This vehicle is two-wheeled, of wood, strengthened with iron. Diameter of wheels, 1.622 meters. It is used to transport everything not appropriate to the caissons or section carts—forage, etc.

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Forge.—This is the 1863 model. It consists of the limber and forge proper. The wooden limber carries a coal chest, beaked anvil, bellows, chest of tools, and a tub.

AMMUNITION.

PROJECTILES.—The three kinds of projectiles now used by the Spanish artillery are common shell (segmentary), shrapnel, and canister. Incendiary shell, which were formerly part of the battery equipment, are no longer employed.

In his "Libro de Memorias," Captain Ugarte mentions a large number of projectiles. Thus, for the 9-c. gun, in addition to the segment shell, which is regulation under the name of "Model 1879," he refers to four models of common shell: 1868 model, weighing 4.300 kilograms; 1873 model, weight 3.662 kilograms; 1875 model, weight 3.761 kilograms, and the 1878 model, weighing 3.768 kilograms.

These four models are now obsolete for field service; each marked a change or an improvement in the field artillery service.

The 1868 model, with thick, lead coat, is known as "*de envuelta pesada*" (literally, heavily wrapped); it corresponds to the projectile of the first breech-loading guns purchased of Krupp.

The model of 1873, obtained by considerably reducing the thickness of the coat of lead in order to have but one projectile for both field and mountain guns, is known as "*de envuelta ligera*" (literally, lightly wrapped).

The 1875 model is cast, and has double walls.

The 1878 model is a segment shell; it is the first of this type cast, and is still used in the mountain artillery.

Similar remarks may be made with reference to shrapnel, but it will suffice to describe below the projectiles referred to in Vol. I, Firing Regulations of 1894, under Title IV, for the instruction of artificers; the canister, model 1881, now obsolete, will, however, be omitted.

For 8-c. guns.—The 8-c. field guns, whether of steel or bronze, use the following projectiles:

The segment shell, model 1879;
The shrapnel, model 1887, and
The canister, model 1884.

Segment shell, model 1879 (for 8-c. guns, model 1879).—This projectile is cast, and has a central bursting charge. The

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percussion fuse, model 1882, is used with it. Fig. 12, pl. 3, gives its principal dimensions. It has two copper bands—one, smooth at the base of the ogive, a centering band, and serving only as a supporting surface; the other, with circular grooves, is near the base, and is a forcing band.

The interior part is formed of ten annular disks, each divided into eight segments.

The shell, empty, weighs 4.378 kilograms; the bursting charge, 115 grams, and the shell, loaded and including fuse, 4.588 kilograms.

Shrapnel, model 1887 (for 8-c. gun, model 1887).—This has the bursting charge in the base, and is used with the time fuse, model 1891. The body, of wrought iron, is screwed to two cast pieces, forming, respectively, the ogive and base; a diaphragm divides the interior space into two chambers; the lower chamber, which communicates with the fuse by an axial tube, receives the bursting charge, and the upper one contains 140 bullets cemented with resin. Each bullet weighs 13 grams, and is 13.5 millimeters in diameter. A lateral opening is provided for the screw which secures the fuse in place.

The shell, empty, weighs 4.647 kilograms; its bursting charge, 60 grams, and the shell, loaded and with its fuse, 5.160 kilograms.

Canister, model 1884.—The case is of sheet zinc, its top and base of cast zinc, and it is encircled by two lead bands. It contains 48 bullets in sulphur cement, and weighs, loaded, 3.425 kilograms. Each ball weighs 35 grams, and is 21 millimeters in diameter.

For 9-c. guns.—The projectiles used are the segment shell, model 1878; shrapnel, model 1887; and canister, model 1884.

Segment shell, model 1878.—This shell is cast, has a central cavity, and is used with the Krupp percussion fuse. Fig. 13, pl. 3, gives its principal dimensions. It has four copper forcing bands—two near the ogive and two near the base. The inner portion consists of 12 annular disks, each divided into 10 segments. Its weight, empty, is 6 kilograms; the bursting charge is 210 grams; weight, loaded and with fuse, 6.3 kilograms.

Shrapnel, model 1887.—This projectile, similar to that for the 8-c. gun of the same model, contains 210 bullets. Each bullet weighs 13 grams, and is 13.5 millimeters in diameter.

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The case, empty, weighs 6.654 kilograms; bursting charge is 68 grams; loaded and with fuse its weight is 7.172 kilograms.

Canister, model 1884.—The case, like that for the 8-c. gun, contains 91 bullets of the same weight and diameter, and it weighs, loaded, 5.685 kilograms.

PROJECTILES FOR THE SOTOMAYOR GUNS, MODEL 1880.—These guns use common shell, shrapnel of a special model, and, provisionally, the same canister as the other 8-c. guns.

Common shell.—This is of steel, is used in conjunction with the model 1882–90 fuse, and has but one band, which is near the base. Fig. 7 gives its principal dimensions. The outer

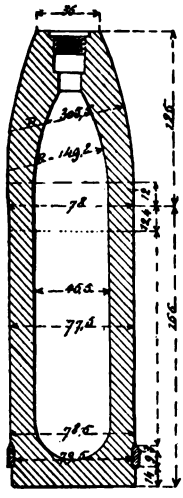

Fig. 7.

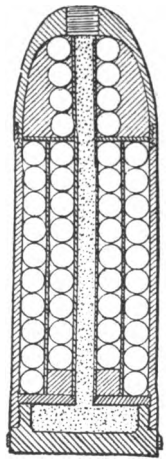

Fig. 8.

surface of the band is cylindrical in rear and conical in front, and the inclination of the cone is the same as that of the junction of chamber with bore, so that when the projectile is introduced these surfaces are exactly in contact, the projectile is centered, and the band acts both as a supporting and forcing band.

Weight, empty, 5.970 kilograms; bursting charge is 150 grams; loaded and with fuse, 6.300 kilograms.

Shrapnel.—This projectile (fig. 8) has a soft steel envelope 4.75 millimeters thick, to which are screwed a steel base and

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a cast-iron ogive. There is a copper band near the base, and the exterior surface is lathe-finished and bronzed in hot air. The bursting charge is placed partly in rear between the base and a soft steel diaphragm, and the rest in a central tube resting on this diaphragm.

The 231 bullets are arranged as follows: The space between the central tube and envelope is divided into two parts by an intermediate wrought-iron tube, 2 millimeters thick, resting on the diaphragm and extending to the front threaded part of the envelope. Between the envelope and this tube are ten layers of fourteen bullets each, held in place by walnut wedges; between this and the central tube, resting on a walnut ring, are nine layers of seven bullets each, also held in place in like manner. A wrought-iron ring, 1 millimeter thick, is placed above this, and the rest of the bullets are in four layers of seven each in the ogive at the end of the tube. The space between the bullets and ogive wall is filled by a walnut plug of proper shape.

The bullets are made of an alloy of lead and antimony, are 12.6 millimeters in diameter, and their total weight is 2.633 kilograms.*

Length of shrapnel without fuse, 24 centimeters; weight, empty, 2.770 kilograms. The bursting charge weighs 81 grams, 53 in the base and 28 in the central tube. Loaded and with fuse, the projectile weighs 6.347 kilograms.

PROJECTILES FOR THE SOTOMAYOR GUN, MODEL 1891.—Shell, shrapnel, and canister of a special pattern are used with this gun. The shell and shrapnel have the same length, weight, and sectional density. The length with fuse attached is 3.82 calibers, about 30 centimeters; weight, 7.260 kilograms, and sectional density 150 grams.

The shrapnel contains 231 bullets, like the first model, but each bullet weighs 13 grams, making their total weight 3 kilograms, or 41 per cent of the weight of the projectile. The bursting charge of the shell is 307 grams; of the shrapnel, 136 grams.

The canister weighs 7.131 kilograms, and contains 304 bullets of 16 grams each.

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*The quotient of 2.633 by 131 gives 11.49; but this is only a mean, for the bullets in the ogive are of smaller diameter than the others.

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TABLE 6.—NUMERICAL DATA—PROJECTILES.

Nature of data.		8-c. guns.	9-c. guns.	Sotomayor guns.	
				Model 1880.	Model 1891.
Common shell:					
Weight of projectile, empty	kilograms	4.378	6.000	5.970	
Weight of projectile, loaded	do	4.588	6.300	6.300	*7.260
Weight of bursting charge	grams	116	210	150	307
Shrapnel, segment, or bullet:					
Weight of projectile, loaded	kilograms	5.160	7.172	6.437	7.260
Weight of bursting charge	grams	60	68	81	136
Number of bullets		140	210	231	231
Weight of bullet	grams	13	13	11.4	13
Diameter of bullet	millimeters	13.5	13.5	12.6	
Canister:					
Weight of case	kilograms	3.425	5.685	3.425	7.131
Number of bullets		48	91	48	304
Weight of bullet	grams	35	35	35	16
Diameter of bullet	millimeters	21	21	21	

*7.600 kilograms, according to the v. Lobells Jahresberichte, 1895.

POWDER.—The only regulation powder, according to the Regulations of 1894, is a black powder composed of 74 parts of niter, 10 of sulphur, and 16 of charcoal; its density varies from 1.664 to 1.667.*

The thickness of grain for gun cartridges, other than those of the Sotomayor system, varies from 6 to 10 millimeters. For the latter, the grains vary from 9 to 11 millimeters on the edges.

The regulation charges are:

	Kilograms.
For 8-c. guns of compressed bronze	1.250
For 8-c. guns of steel	1.000
For 9-c. guns of steel or compressed bronze	1.500
For 8-c. guns, Sotomayor system	1.550

The cartridge bags are of floss, or spun silk, and cylindrical.

As to the Sotomayor gun, model 1891, a charge of smokeless powder has been used experimentally—600 grams of "balastite," 3 millimeter grains, coming from Bilbao. The balastite consists of equal parts of collodionized gun cotton and nitroglycerin mixed with 5 per cent of aniline.

*The early adoption of a smokeless powder for the Spanish artillery seems probable. It is at least to be inferred from accounts given by the "Memorial de Artillería" of September and October, 1896, of experiments made with different powders of this kind.

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APPLIANCES.

FUSES.—Three kinds are used:

(1) The percussion fuse, model 1882–90;
(2) The Krupp-Rubini time fuse, model 1891; and
(3) The Krupp combination fuse, model 1894.

The Krupp-Rubini fuse displaced two other time fuses—the model of 1880 and the Krupp, which were used a long time; but it is destined to be discarded since the adoption of a combination fuse.

Percussion fuse, model 1882–90.—As its name indicates, this is an improvement of the percussion fuse of 1882. It consists of five principal parts (fig. 9)—the head *a*, plunger sleeve *g*, fulminate holder *b*, plunger *p*, and the guard disk *d*. The plunger sleeve is of brass; and the other parts of an alloy of equal parts of brass and bronze. The head screws into the fuse hole and similarly receives the fulminate holder. The fulminate cap is held in place by the screw plug *j*. The plunger sleeve is pushed under friction into the fuse hole where it is held by the flange *r*, and is succeeded under gentle friction by the plunger, which carries the steel firing pin *e*. The guard disk *d* is held in place by a Packford spring, *f*, of which the metal consists of 8 parts of copper, 3 of nickel, and 3.5 of zinc.

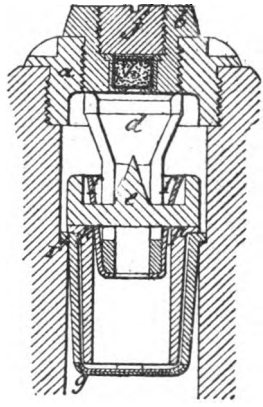

Fig. 9.

The following changes in this fuse were made in 1890: The spring, of which the power conformed to the use made of the fuse, was regulated in such a manner that the model 1882–90 can be used in all guns of the field and siege service and of the permanent and seacoast fortifications.

Time fuse, model 1880 (see fig. 11, pl. 3).—This, similar to the Bazichelli fuse of the Italian artillery, is a percussion fuse with a dial or adjustment scale, having millimetric graduations from 0 to 11 centimeters.

The fuse composition is in a circular tube of lead resting partly in the face of the fuse body and communicating through a channel in the latter with the bursting charge. A movable

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covering ring, into which the fulminate hol
incloses a chamber, *C*, containing powder.
discharge, the concussion plunger *E* detona
and ignites the powder, which produces a
ciently powerful to fuse the leaden tube a
fuse composition.

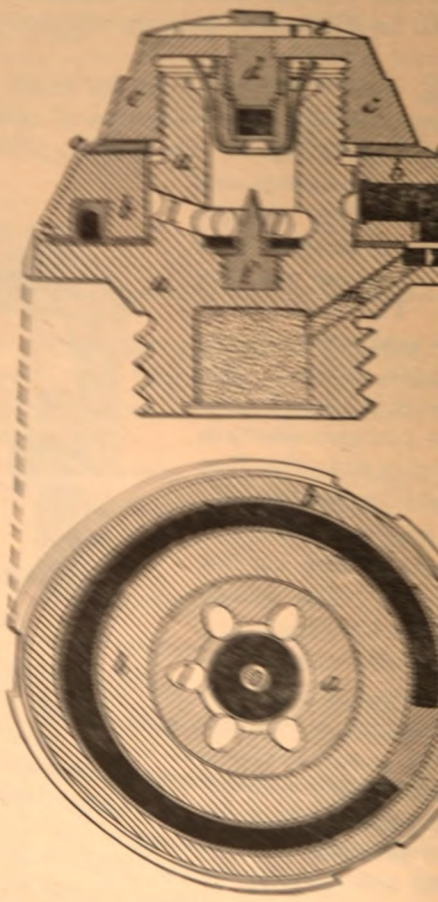

Fig. 10.

Time fuse, Krupp-Rubini system.—As
name, this appliance is an improvement of
fuse.

The latter (fig. 10) comprises the body, reg
cap, cylindrical fulminate holder, spring, an

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The body *a* is a solid piece with hollowed ends threaded outside. The front cavity contains the firing-pin *f*, the base of which is surrounded with compressed powder; the rear end, which screws into the fuse hole, contains a powder chamber communicating by channel *m* with the front face of the body as shown. A mark, *g*, on this face is opposite the channel *m* and at the intersection of an axial plane of the body with its lateral or side surface.

The fuse graduation is on the circumference of the ring *b;* a circular groove contains the fuse composition, which is confined in a pewter tube, the extremity of which corresponds to the zero of graduation and communicates with the fulminate by a spiral groove, *h*.

The disk *o* is circular, with a central opening, and has two small ears to prevent it from revolving. The cap *c* is a truncated cone, and serves as a closing screw. The cylindrical fulminate holder or concussion plunger *d* traverses the closing screw, to which it is attached by the safety pin *e*, which is a doubled brass wire passing through a hole in the plunger.

The spring *j*, of nickeled brass, has two branches attached to the edge of the disk, which has a central opening for the firing pin. The tension of the spring varies from 2 to 5 kilograms.

When the fuse is adjusted, the twine which secures the safety pin in place is removed and the pin withdrawn.

The action is as follows: At the shock of discharge the concussion plunger, by its inertia, strikes the firing pin, the fulminate is detonated, and the compressed powder ignited. The flame, issuing from the five circular openings *l* of the body and traversing the spiral channel of the movable ring, sets fire to the fuse composition; the flame then proceeds in both directions and reaches the channel communicating with the powder chamber and bursting charge.

The Krupp-Rubini fuse presents the following differences from that just described:

(1) The concussion plunger has a spherical instead of a flat base, consequently the fulminate itself is of spherical form.

(2) The spring has four branches instead of two.

Two time fuses of this kind were adopted in 1891—one of thirteen seconds, for direct fire, and the other of twenty-five seconds, *à double étage* (two-storied, referring to the fuse composition channel and the graduations), for curved fire. The

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13-second time fuse is shown in figs. 1 to 5, pl. 3; it is graduated to seconds and fifths of seconds; an arrow, at the middle point of the blank space in the graduation, corresponds to the middle of the partition separating the two parts of the fuse composition.

Combination fuse, Krupp, model 1894.—There are two principal parts (fig. 11)—the body *A*, which screws into the fuse hole, and the fulminate-holder plug *P*, screwed into the body.

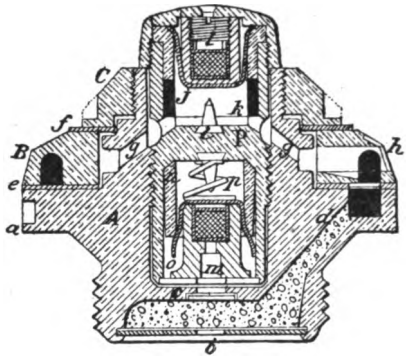

Fig. 11.

The body contains a powder chamber, *b*, communicating with the interior of the fuse by two openings; the opening *c* is for the flame jet due to percussion fire, and the channel *d* for that proceeding from the fuse composition. The ring *B* rests on a disk, *e*, of thin felt, and is capped by a metal disk interposing between it and the closing screw *C;* its outer part incloses the fuse composition, and the exterior surface is graduated into seconds and tenths of seconds. At the shock of discharge the jet of flame traverses the six openings *g*, the gas escaping at the vent *h*.

The fulminate-holder plug has two attachments—one to ignite the fuse composition and the other to cause the bursting of the projectile from shock.

The first effect is produced by means of the concussion plunger *i* in the front part of the holder, and the other by the means in the rear part consisting of the fulminate holder *m*, the sleeve *n*, a strong spring with two branches, *o*, and a small spiral safety spring, *p*.

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Fig. 11 shows the fuse at rest. Fig. 10, pl. 3, represents the effect just after firing, when the concussion plunger has acted and the fuse is armed (for time effect); at this instant the fuse is ignited and the percussion element insures the bursting on striking.

There is no peculiarity attending the manipulation of this fuse.

It is graduated up to 15½ seconds, corresponding to a range exceeding 3,500 meters. Its total weight is 520 grams, and its mean error at 2,000 meters is 24.5 meters.

The fulminate-holder plug is inserted only at the moment of firing, up to that time being replaced by a cork. Before loading, the artificer removes the cork by means of a cord attached to it, adjusts the fuse, and screws the plug home.

Fuse wrenches.—For handling and regulating these different fuses, several wrenches have been successively adopted—one the model 1886, another the model 1886–91, and finally the model 1893; this last one is now in use.

Friction primers.—Two kinds are used in the field service—the models of 1857 and 1881. They consist of two copper tubes at right angles, the end of the shorter tube embracing the other. The longer tube, filled with rifle powder, is placed in the vent; the other tube is called the "mouthpiece," and contains the fulminate and friction wire.

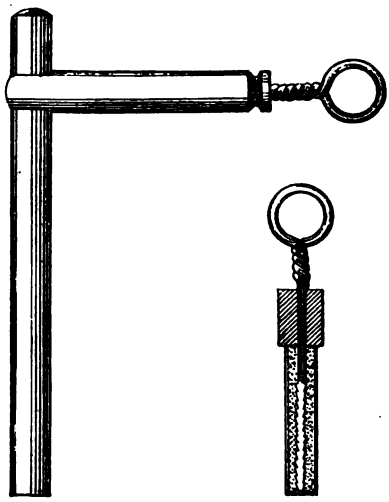

Fig. 12.

Model 1857 is shown in fig. 14, pl. 3, and model 1881 in fig. 12 (text). As may be observed, the shorter tubes are different—in model 1881 this tube is cylindrical instead of flat—and the dimensions are also unlike as well as the shape of the fulminate and of the friction wire.

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POINTING AND FIRING.

POINTING INSTRUMENTS.—*The front sight.*—All guns, whatever their model, are furnished with the Armstrong front sight. It has a threaded body (or shank) with a rectangular head (fig. 13). The head has a projecting point at the top and a central opening containing a reticule formed of two copper threads.

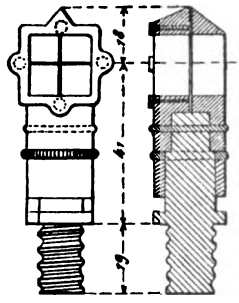

Fig. 13.

The front sights of the Sotomayor guns are protected by a spring sight cover, which, during firing, is suspended from a projection on the right trunnion.

Breech sights.—Three models are in use: the Armstrong, for all 8-c. guns; model 1879, for 9-c. bronze guns; and the Krupp breech sight for 9-c. steel guns.

The breech sight for 8-c. guns (fig. 14) consists of a rectangular bar with a sliding ferrule, and a plate, which has a notch in its top and a peephole; the ferrule and plate are held in place by a clamp screw. The bar is graduated on its face into millimeters, and on its sides into distances corresponding to the projectiles used; the left-hand side, arranged for shrapnel fire, gives the fuse adjustments.

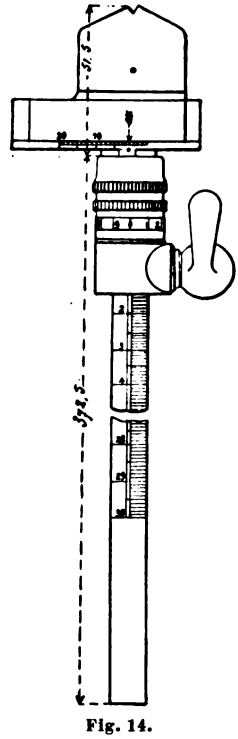

Fig. 14.

The plate or deflection slide is graduated into millimeters; 20 millimeters to the left and 5 to the right.

Beneath the head is a micrometer screw having a thread interval of 1 millimeter and 10 circumferential divisions; consequently a turn through the interval of one division causes a vertical displacement of the head equal to $\frac{1}{10}$ millimeter.

For 9-c. guns the deflection slide of the breech sight has an attached tube which contains a worm screw to effect lateral displacements of the sight; the bar is

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hollow and of triangular cross section; it has no ferrule, but is held in the desired position by the clamp screw of the breech seat.

The breech sights are removed before firing.

Pointing level.—This has no special peculiarity. It consists of a brass plate (fig. 15), the edges of which project sufficiently to protect the instrument. The level arm turns about a pivot at one of the angles of the plate, and is held at any desired point by a clamp screw which traverses a circular slot along the edge of a graduated arc.

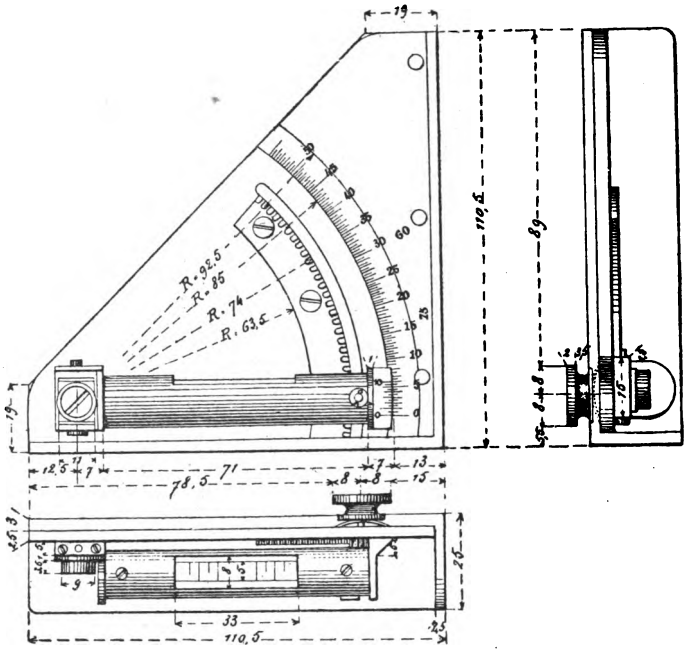

Fig. 15.

Auxiliary sights and peepholes.—The auxiliary sight is a small pointed plate attached to the head of the breech sight by a pivot screw, around which it may be revolved into sighting position (fig. 2, pl. 4).

The auxiliary peephole (sight) is another plate with a small opening, attached to the front sight, and serves as a peephole for aiming to the rear (fig. 4, pl. 4).

The auxiliary front and peephole sights are usually turned down, as in this position they do not prevent direct aiming; when raised to their highest position, the line of sight is said to be "inverted."

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Reference staff and marking stake.—The staff (fig. 1, pl. 4), of iron, and telescopic, like a surveyor's rod, carries a circular disk at its upper extremity, which is painted white on one face and black on the other, and has a triangular central opening.

The disk or target section may be held at any height by a clamp screw, and a muff or collar screw clamp permits the head of the picket section to be raised or lowered so as to adjust the target disk exactly. When this telescopic apparatus is closed, the target disk rests between two protecting disks attached to the head of the lower section.

When the pointing is referred to the staff, No. 2 marks on the ground with a stake the point of rest of the wheel on his side; the stake used for this purpose (fig. 3, pl. 4) has two points 5 centimeters apart, and it is placed so that one of its arms shall be in contact with a felly. A staff and stake are supplied to each piece.

TABLES OF FIRE.—For guns other than those of the Sotomayor system, the manual of firing provides for the employment of indirect fire with reduced charges. The reduced charge is one-half the normal. The tables extend to 4,000 meters for direct shell fire, and to 3,000 meters for indirect shell fire and for shrapnel firing.

The tables for Sotomayor guns extend to 5,000 meters for direct shell and shrapnel fire.

The following table gives a résumé of the initial elements of fire for the different pieces:

TABLE 7.—INITIAL ELEMENTS OF FIELD FIRING.

Guns.	Kind of fire.	Weight of projectile.	Weight of charge.	Initial velocity.	Distance between front and rear sight.
		Kilograms.	*Kilograms.*	*Meters.*	*Meters.*
C. BC. 9 c. and C. Ac. 9 c.	Direct, shell	6.300	1.500	451	C. Ac. 9 c., 1.000; C. BC. 9 c., 1.050
	shrapnel	7.172	1.500	420	
	Indirect, shell	6.300	0.750	310	
C. BC. 8 c	Direct, shell	4.600	1.250	483	1.000
	shrapnel	5.157	1.250	460	
	Indirect, shell	4.600	0.625	320	
C. Ac. 8 c., Rf	Direct, shell	4.600	1.000	455	0.800
	shrapnel	5.157	1.000	426	
	Indirect, shell	4.600	0.500	300	
C. Ac. 8 c. (Sotomayor model 1880).	Direct, shell and shrapnel	6.300	1.550	460	1.000
C. Ac. 8 c. (Sotomayor model 1891).	Direct, shell and shrapnel	7.260	0.600 balastite.	510	

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SHELL AND SHRAPNEL.—TABLE FOR DIRECT FIRE FOR THE 8-C. SOTOMAYOR STEEL GUN.

	Kilograms.		*Meters.*
Weight of shell loaded	6.300	Initial velocity	460
Weight of charge (9 to 11 millimeters)	1.550	Distance between front and rear sights	1

Ranges.	Angles of fire.		Breech-sight indications.	Deflection-scale indications.	1 millimeter on breech sight causes a variation in the range of—	1 millimeter on breech sight or deflection scale causes a variation in height or direction of—	Maximum ordinates.	Abscissa corresponding to maximum ordinates.	Angle of fall.		Dimensions of rectangles containing 50 per cent of hits.			Time of flight.	Remaining velocity.	Dangerous zones.		SHRAPNEL.					
											Lateral.	Vertical.	Longitudinal.			For infantry.	For cavalry.	Fuse graduation.	Length of zone containing 50 per cent of bursts.	Deviations as determined from the—			
																				Heights of bursting.		Intervals of bursting.	
																				Minimum.	Maximum.	Minimum.	Maximum.
	°	′	*Mm.*	*Mm.*	*M.*	*M.*	*M.*	*M.*	°	′	*M.*	*M.*	*M.*	*Secs.*	*M.*	*M.*	*M.*	*Secs.*	*M.*	*M.*	*M.*	*M.*	*M.*
500 meters	0	5	1	0.0	33	0.5	----	180	0	47	0.42	0.39	------	1.15	411	140	210	1.1	34.52	0.41	0.87	29.34	69.04
1,000 meters	0	55	16	0.5	33	1.0	6	430	1	47	0.51	0.65	20.9	2.43	371	63	94	2.5	31.16	0.85	1.99	26.48	62.32
1,500 meters	1	52	32	1.0	25	1.5	14	700	3	5	0.73	1.06	------	3.85	337	37	55	3.8	28.31	1.30	3.06	24.06	56.62
2,000 meters	2	59	52	2.0	25	2.0	26	983	4	41	1.02	1.58	------	5.41	309	24	36	5.4	25.96	1.76	4.15	21.99	50.36
2,500 meters	4	14	74	3.0	20	2.5	50	1,300	6	39	1.43	2.20	------	7.11	285	15	22	7.1	23.94	2.36	5.35	20.22	45
3,000 meters	5	41	99	3.5	20	3.0	87	1,601	8	57	1.91	2.96	18.7	8.96	266	11	17	8.9	22.34	2.96	6.97	18.75	44.10
3,500 meters	7	19	128	4.5	16	3.5	134	1,885	11	46	2.56	4.65	22.4	10.98	250	9	13	11.0	21.00	3.57	8.40	17.47	41.16
4,000 meters	9	9	162	5.5	14	4.0	201	2,180	14	58	3.98	8.85	33.1	13.16	235	7	11	----	----	----	----	----	----
4,500 meters	11	15	199	7.0	12	4.5	282	2,450	18	41	------	------	------	15.54	225	5	8	----	----	----	----	----	----
5,000 meters	13	41	243	10.0	11	5.0	383	2,710	23	20	------	------	------	18.16	216	4	6	----	----	----	----	----	----

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The preceding form shows, for the Sotomayor gun, model 1880, the arrangement of the table of fire and nature of the data, as well as the elements of fire for ranges varying by 500 meters up to 5,000 meters.

TIME OF FLIGHT SCALES.—Chiefs of piece are supplied with a scale which gives the adjustment of the fuse corresponding to each range. Fig. 16 shows this scale for the 8-c. compressed bronze gun (C. BC. 8 c.).

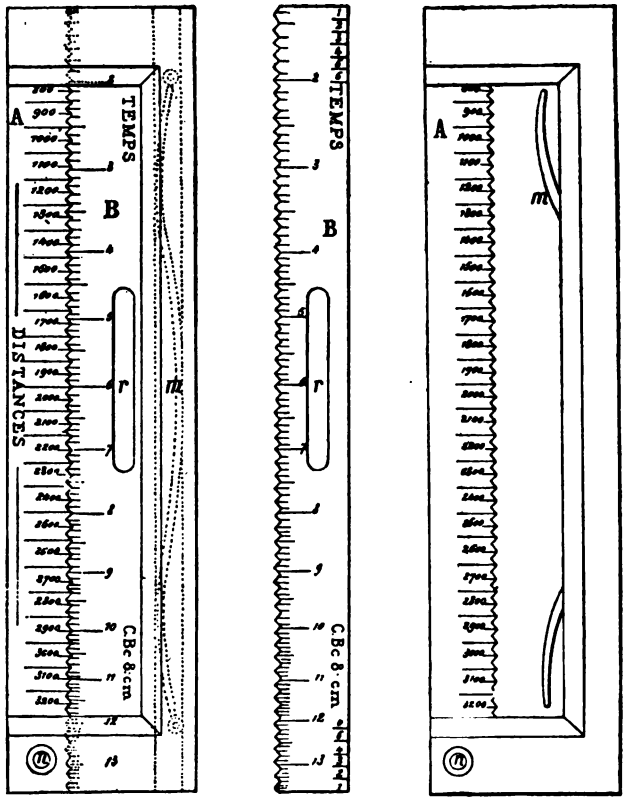

Fig. 16.

It consists of an iron frame carrying a fixed scale, *A*, graduated in distances, and a movable one, *B*, graduated in times of flight. When the latter is in its initial position, the indications conform to the table of fire. The inner edges of the scales are toothed, and are kept in contact by the spring *m*. At each end of the movable scale is a subscale showing the

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relative position it should have with regard to the fixed scale. The hole *n* is for a cord or strap.

To slide the movable scale one or more divisions, disengage the teeth by placing the thumb in the slot *r*, and compress the spring; then move the scale endwise till the required division is cut by the outer edge of the frame.

When shrapnel fire is ordered, the chief of piece suspends the apparatus by its cord about his neck, thus leaving his hands free until he needs it. When the captain gives the range, he observes the corresponding division of the scale and causes the fuse to be adjusted accordingly; this is repeated for every new range. Unless otherwise directed, the scale is left in its initial position, and this adjustment is changed only at the captain's command.

Chiefs of pieces of the same section should frequently compare their scales during shrapnel firing, to insure a correct adjustment of the fuses. This should also be done between sections by the chiefs of sections; the captain also should direct it to be made if he observes abnormal bursts.

EFFECT OF PROJECTILES.—The manual of fire gives the following information in regard to the effect:

Shell.—The 8-c. and 9-c. segment shell have great penetrating power, diminished, however, by the sensitiveness of the fuse, which causes the projectile to burst prematurely.

Into earth parapets, a bursting shell penetrates from 70 to 80 centimeters; when unexploded, from 1.5 to 2 meters, according to the earth's consistency.

It penetrates a brick wall of slight thickness and bursts beyond. A double wall would be a protection against its effect, and troops placed behind houses may be regarded as sheltered from this fire.

Against troops, the bursting effect extends 30 meters beyond the bursting point.

Shrapnel.—The fuse used with shrapnel may be used either as a combination or time fuse. The cone of dispersion varies at mean distances between 12 and 16 degrees. Its effect against objects is, on account of its small bursting charge, much inferior to that of shell. Its effectiveness with fuse employed extends to 300 meters beyond the point of bursting. With the fuse set at zero, it bursts about 120 meters from the muzzle.

Canister.—This is very effective at ranges less than 300 meters, but the effect diminishes rapidly beyond this limit.

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To obtain a similar effect between 300 and 700 meters, use shrapnel with fuse set at zero.

The following table from the manual of fire, gives the respective dimensions that the different objectives must have for different guns at ranges of 1,000, 2,000, and 3,000 meters for effective fire:

TABLE 8.—RANGES AT WHICH THE FIRE OF VARIOUS GUNS IS EFFECTIVE AT DIFFERENT OBJECTS.

Ranges.	Objectives.	Dimensions of objects required when fired at by the—							
		9-c. guns, C. BC. or C. Ac.		8-c. guns.				Sotomayor guns.	
				C. BC.		C. Ac. Rf.			
		Lateral.	Vertical.	Lateral.	Vertical.	Lateral.	Vertical.	Lateral.	Vertical.
		Meter.	*Meter.*	*Meter.*	*Meter.*	*Meter.*	*Meter.*	*Meter.*	*Meter.*
1,000 meters	Infantry, kneeling	0.5	0.9	0.52	0.9	0.68	0.9	0.38	0.9
	Infantry, standing	0.3	1.8	0.31	1.8	0.41	1.8	0.25	1.8
	Cavalry	0.28	2.75	0.29	2.75	0.36	2.75	0.24	2.75
2,000 meters	Infantry, kneeling							2.07	0.9
	Infantry, standing	2.03	1.8	2.07	1.8	3.93	1.8	0.9	1.8
	Cavalry	1.20	2.75	1.36	2.75	2.28	2.75	0.62	2.75
	Column	1.55	22	1.66	21.6	2.28	38	1.02	19.2
		2.10	12.54	3.32	12	4.56	21.66	2.04	10.94
		3.65	10.34	4.98	10	6.84	17.86	3.06	9.02
		5.20	10.34	6.64	10	9.12	17.86	4.08	9.02
3,000 meters	Infantry, standing							3.46	1.08
	Cavalry	6.45	2.75	9.35	2.75			2.03	2.75
	Column	3.18	26	3.69	26.6	4.84	41.8	1.91	18.74
		6.36	14.82	7.38	15	9.76	25.8	3.82	10.66
		9.54	12.22	11.07	13	14.64	19.6	5.73	8.79
		12.72	12.22	14.76	12	19.52	19.6	7.64	8.79

OBSERVING THE EFFECT OF FIRE.—Each battery is supplied with observers, or signalmen. They are ordinarily stationed on the battery flanks, and thence communicate with the battery by means of a "fanion," a special signal apparatus. The fanion resembles a portfolio, and has two white flat arms pivoted at its middle point when open. It is carried at the belt. The different positions of these arms and the corresponding signals are shown in figs. 5 to 17, pl. 4.

To communicate, the observer displays the fanion, turns the arms to the required position, and holds them there with both hands.

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DETAILS CONCERNING THE MODE OF EMPLOYMENT OF THE PIECES.

Composition and divisions of the field batteries.—On a war footing, the mounted battery comprises 6 pieces, 6 caissons, 2 section wagons, and 1 Catalonian cart. The horse battery has no Catalonian cart, but includes 1 spare carriage, and 8 caissons instead of 6.

The personnel consists of 1 captain commanding, 4 lieutenants, 6 chiefs of piece, 6 or 8 chiefs of caisson, and 5 or 7 cannoneers to a piece—the higher numbers corresponding to a horse battery—and 2 section artificers; besides trumpeters, orderlies, laborers, gunners, and drivers necessary for the service.

For active service, the battery is divided into two echelons. The first echelon is the fighting part, and comprises the 6 pieces, 2 caissons, and some of the spare teams; it is divided into two equal sections.

The second echelon comprises the remaining personnel and matériel.

The senior lieutenant commands the first section, the next in rank the second section, the third is a file closer of the fighting battery, and the fourth commands the second echelon.

Formations and drills.—As a rule, the fighting battery drills separately. On the march, the second echelon follows it at a distance of 13 meters; in fighting order, the normal distance between them is 500 meters.

The rules for the march and the handling of the fighting echelon are very much like those now in force in France for the same unit.

For the order in battery (fig. 17), the fighting battery is deployed in three lines with distances of 13 meters; the six guns in front with 13 meters intervals, measured from center to center; the two caissons in the second line, each opposite the middle gun of its section, and the six limbers in the third line, each in rear of its gun.

In the horse batteries, the groups of cannoneers' horses form a third line 6 meters in rear of the caissons, and the limbers a fourth line, 2 meters in rear of the rear rank of the horse groups.

These formations are prescribed for instruction purposes. On the battlefield they would conform to the terrain and to the conditions of security afforded by various elements.

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However, it is recommended that greater intervals than those prescribed be avoided, in order that the captain may have control of the personnel.

On going into battery, the captain must indicate the position for the limbers, which are assembled on one of the flanks, if shelter is there afforded; for the same object, they can be removed to a considerable distance from the guns when there is no immediate prospect of an attack or change of position.

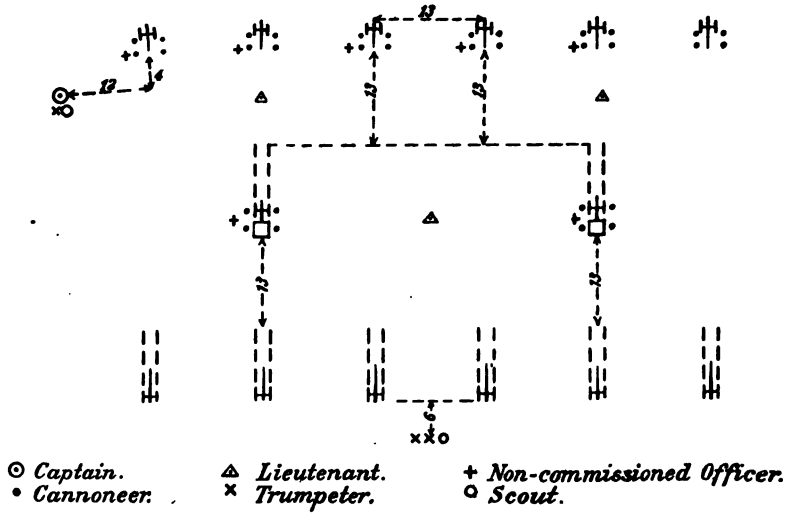

Fig. 17.

Figs. 21 and 22, pl. 7, show the park formations for horse and mounted batteries.

Various rules.—Distribution and resupply of ammunition is usually effected by the caissons. Ammunition is only exceptionally supplied from the limbers; in which case the limbers are taken to the rear of the guns, the lead horses 6 meters in rear of the pointing levers, while the caissons by a half wheel take position 13 meters in rear of the limbers.

It is prescribed that when the battery position is not defiladed, the guns shall arrive loaded, so as to open fire as soon as possible; the battery is first halted under shelter and guns are loaded; it is then moved up either by hand or with the teams, according to the distance.

The guns are kept loaded while changing position in presence of the enemy.

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Finally, when a battery may expect a close and sudden attack, six rounds of canister must first be placed on the ground near each gun.*

Hasty epaulments.—A battery called upon to occupy a given position for a certain time should construct hasty epaulments, if it has at least one and one-half hours at its disposal before opening fire.

The Manual of Fire gives an example of the trace of an epaulment (see figs. 18 to 20, pl. 4); a ditch 0.5 meter in depth is dug along the sides of a square 3 meters on a side; the earth is thrown to the front to form a parapet, and, if possible, two excavations are made for the cannoneers and two niches for the ammunition. The captain is not required to conform strictly to this model; it rests with him to improvise a useful shelter for his gun and the cannoneers in the time at his disposal.

Each gun is placed behind an epaulment as soon as possible, and the parapet is concealed from the enemy by the use of grass and foliage.

*Art. 139, Manual of Fire.

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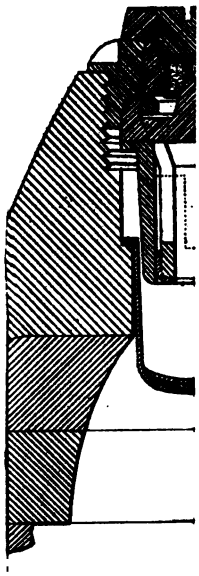
fig. 7.—St



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Park formations.

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fig. 14.—2 sh

fig. 21.—Mounted battery.

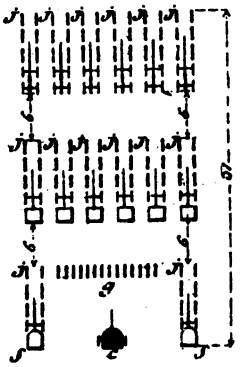

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fig. 22.—Horse battery.

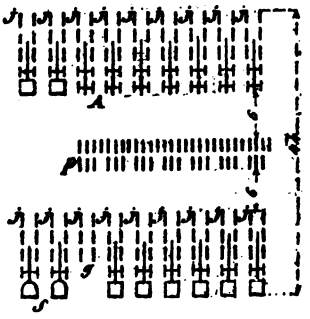

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fig. 16.—1 l

yond.

fig. 17.—1 bu

Legend.

J.— Chief of section.

g.— Spare teams.

S.— Section carts.

C.— Catalonian carts.

A.— Spare carriages.

p.— Groups of gunners.

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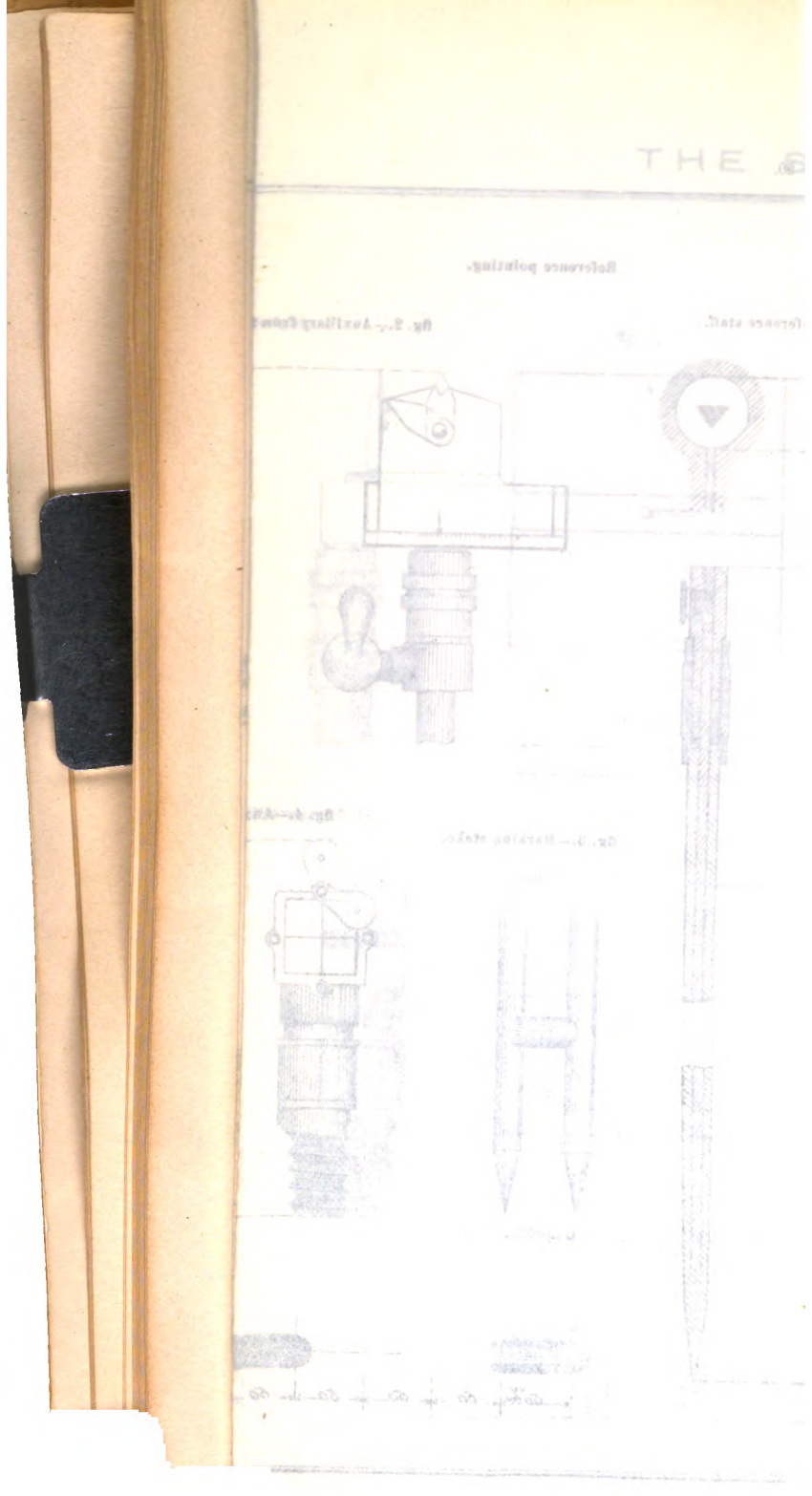

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MANUAL

FOR

COSSACK RIDING AND TRAINING OF HORSES.

By Colonel C. FLEISHER.

Translated from the Russian

By First Lieut. G. W. READ, Fifth U. S. Cavalry.

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INTRODUCTION.

The need of a manual containing as far as possible all that relates to Cossack riding and the training of Cossack horses has long been recognized. In the course of the last few centuries nearly 200,000 natural Russian cavalry, the Cossacks, have been developed by natural means, by uninterrupted warfare. They have worked out characteristic methods of riding and training horses, fully corresponding to the peculiarities of the Cossack saddle and horse equipments. Now that border wars have ceased and the Cossacks have entered upon a life of peace, it seems necessary to record all that relates to their riding and training of horses, formerly transmitted by practice and developed by continual service.

In the present work it has been our object to record all the principles of Cossack riding and training of horses which can be practiced advantageously.

Leaving our comrades in arms to judge how far we have succeeded in accomplishing our self-imposed task, we beg them to look with kindness upon a work which has the sole aim of benefiting the service.

Any suggestions in regard to changes in the manual which would be of profit to the service will be gratefully received.

We have adopted the arrangement by paragraphs as the most suitable for inquiry and reference.

In preparing this manual, we have made use of information obtained from several Cossack officers who are authorities on the subject, and also of existing regulations, and of official and unofficial manuals and instructions, among which may be mentioned "Instructions for the Cossacks of the Sixth Cavalry Division," by Captain Dookmasoff, prepared by direction and under the supervision of Lieutenant General Koolgatchoff; the writings of Col. E. P. Gaitoff; "Instructions for training horses," by Colonel Novitzkow; and "Materials for the course of the instructor's division of the officers' cavalry school."

C. FLEISHER.

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PART I.—COSSACK RIDING.

CHAPTER I.—THE SEAT, POSITION OF THE HANDS, AND HOLDING THE REINS.

MOUNTING AND DISMOUNTING.

§ 1. *To mount.*—Approach the horse on the left side, throw the reins on the withers or pommel, take them in the left hand, grasping the mane or pommel, place the left foot in the stirrup, take hold of the cantle or pad with the right hand, rise upon the stirrup quickly, lightly, and without bustle, pass the right leg over the horse's back, drop lightly and softly into the saddle, and place the right foot in the stirrup.

§ 2. *To dismount.*—Grasp the mane or pommel with the left hand without letting go the reins, free the right foot from the stirrup, lean lightly on the left foot, pass the right foot over the horse's back and place it on the ground, at the same time grasping the pad or cantle with the right hand; take the left foot from the stirrup and bring it to the side of the right, let go the mane with the left hand and the cantle with the right. Having dismounted, hold the halter shank or the reins with the right hand at the chin so that the horse can not lower its head and may stand evenly on all four feet. The free end of the halter shank or reins should be in the left hand hanging naturally.*

To mount when armed with the lance.—In turning to the horse raise the left hand along the lance until it is a little higher than the withers, rest the butt end of the lance on the ground about three-quarters of a yard from and a little in advance of the front feet of the horse, then, without letting go of the lance with the left hand, mount as above. When in the saddle, grasp the lance with the right hand, pass it in front of the horse's head, place the noose upon the foot and the foot in the stirrup.

*To mount from and dismount on the right side, reverse the above.

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To dismount when armed with the lance.—Free the lance from the foot, pass it in front of the horse's head to the left side, take it in the left hand, rest the butt end on the ground, and dismount as when unarmed.

ADJUSTMENT OF STIRRUPS.

§ 3. The stirrups are properly adjusted when at the height of the ankle bone of the rider as he sits in the saddle with his legs hanging naturally, or if the fist can just be freely inserted between the crotch and the saddle when standing in the stirrups. Five clasps of the hand along the stirrup leather to the top of the stirrup gives the adjustment corresponding to the height of the rider.

Fig. 18.

SEAT (fig. 18).

§ 4. The Cossack should sit in the middle of the saddle, closely but without constraint, trunk vertical, shoulders even,

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head erect, and eyes looking straight to the front between the horse's ears. The inside of the knees should press the saddle closely and should never be turned outward. The trunk to the belt, and the lower part of the legs, from knee to heel, should be perfectly flexible. A support is obtained by pushing the foot half its length into the stirrup; the toe and heel should be at the same height, as in the case of a man standing on the ground, and the feet should be parallel to the sides of the horse, *i. e.*, the toes should not be turned out.

§ 5. The fundamental rules for the seat at a halt do not change when in motion, except that the faster the gait the more the stirrup must be used as a support; the chest may be somewhat advanced, but the rider should neither sit back nor touch the pommel with his belly.

POSITION OF THE HANDS AND HOLDING THE REINS.

§ 6. The position of both arms must be such that there will not be the least strain on the shoulders. The upper left arm to the elbow should be in the line from shoulder to hip, lightly touching the body. The lower arm, from elbow to wrist, depending upon the tension of the reins, is a little in front of the pommel, but never pressed against the breast. The right hand, if not rested on the thigh, hangs naturally, but should not swing with the motion of the horse.

The reins are held in the left hand, the left rein passing between the little and third fingers and the right between the

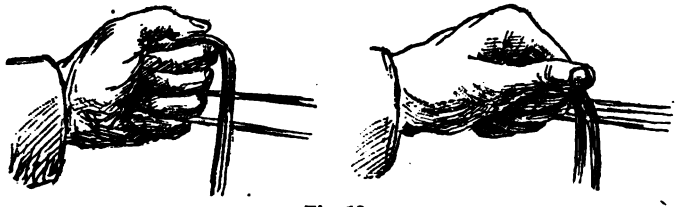

Fig. 19.

third and middle fingers (fig. 19). Both reins are evened, joined, and passed across the index finger, dropping to the right. They are pressed down by the thumb and held closely in the hand, which must be in prolongation of the arm. Depending upon the feeling of the reins, the wrist may be somewhat turned with the nails down.

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CHAPTER II.—RIDING.

GENERAL OBSERVATIONS.

§ 7. The Cossack should know how to ride at the walk, trot, and faster gaits, execute the various turns and abouts, jump the various obstacles, climb with his horse across the different kinds of barriers, and to *jigit*.

In all forward movements he should look straight to the front, but in the turns should glance toward the side of the turn and lean a little to that side.

DIRECTIONS.

§ 8. The reins should be sufficiently tight for the rider to constantly feel the horse's mouth. They should be managed gently, and the rider's chief attention should be directed to preventing a loss of sensibility of the horse's mouth. Therefore, neither at any gait nor in any case should he loosen or tighten the reins, except from time to time to cool the horse's mouth, but this should be done as smoothly and gently as possible and without jerk.

§ 9. *To cause the horse to move forward, whatever the gait.*—Close the legs or strike the horse with them, depending on its temperament, and then yield the reigns sufficiently to enable it to move from place.

To halt.—Tighten the reins evenly, lean backward a little, and slightly close the legs, discontinuing the action of reins and legs when the horse stops.

To force a horse which has deviated from the desired direction to take the proper one.—Move the bridle hand to the side toward which the horse should turn, bend the trunk slightly to the same side, and close the opposite leg, *e. g.*, if the horse inclines to the right, carry the bridle hand to the left and close the right leg.

§ 10. For correct and intelligent riding there must be perfect accord in the management of the reins, the action of the legs, and the use of the whip.

THE USE OF THE WHIP.

§ 11. The whip is necessary as a means of compulsion and of punishment for obstinacy and disobedience. To use it, gather the reins gently and evenly, holding the bridle hand

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on the mane; close the legs, forcing the horse to gather himself; raise the whip in the right or left hand, according to the side on which the blow is to be struck, to about the height of the headdress and a little in front of it; flourish the whip with a wrist motion only and in such a manner as not to frighten the horse; lower the whip and strike the horse in rear of the back girth or on the shoulder, at the same yielding the reins and closing the legs.

When the whip is raised in the right hand, if the horse begins to give way to the left, it should not be struck on the right side, but the whip quickly passed to the left hand and the reins to the right and the blow struck on the left side.

In using the whip it should be remembered that the object is not so much to cause the horse pain as a fear of the blow.

In jumping, if the horse is restless or stops, it should be urged forward by a blow of the whip when two or three paces short of the obstacle, but should not be struck immediately after a jump.

RIDING AT A WALK.

§ 12. *To move forward at a walk.*—Close the legs, yield the reins, and force the horse to move forward. The correct seat should be maintained to keep the horse from obliquing; if this happens, the rider, to resume the former direction, carries the reins to the side to which it is desired to turn the horse and closes the opposite leg, *e. g.*, if the horse obliques to the right, carry the reins to the left and close the right leg.

To halt from a walk.—Tighten the reins quietly and evenly in proportion to the sensibility of the horse's mouth, lean backward a little, and close the legs slightly, observing that the horse does not back or throw its haunches to the side, but stops in the direction in which it was moving.

THE TURNS.

§ 13. All turns at a halt should be made easily and without confusion. In making them the horse must neither back nor move forward.

§ 14. *To turn the horse to the right.*—Move the body and the bridle hand to the right, at the same time giving the horse a light impulse to the right with the left leg, and turn a quarter of a circle to the right. After the turn the body and bridle hand resume their former positions. If the horse

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should fail to obey the reins and begin to back, the legs should be instantly closed strongly until it moves forward, and then by means of the reins and legs it should be forced to execute the required movement.

§ 15. The turn to the left is made as just described, but in reverse order.

§ 16. *To turn to the right or left in a circle.*—The rider, observing the rules prescribed for the turn to the right or left, makes a second turn without stopping until the horse is in the same direction as at the start of this turn, but with the head in the opposite direction.

§ 17. A turn to the right or left in marching is made on the same principle as at a halt, with the difference that the rider, without changing the gait, lightly turns the horse (not upon the same point as at a halt, but about it) upon the arc of a circle, and upon completing the turn causes the horse to move forward in the new direction at the same gait.

§ 18. Turns when marching may be made by causing the right or left shoulder to describe a quarter or half circle. They are executed according to the above rules, except that the turn is not so short, the arc described having a diameter of from 6 to 9 paces.

§ 19. Half turns at a halt and in marching are made like the turns, except that the horse is moved to the designated side on an eighth instead of a quarter circle.

§ 20. To turn to the right or left in a circle when on the march, the horse is first halted and the movement then executed as from a halt.

RIGHT OR LEFT ABOUT.

§ 21. This is executed as follows: From the point where the movement begins, describe an arc from 6 to 9 paces in diameter, and when a semicircle is completed make a half turn toward the line the horse was on when the movement began; upon approaching this line make a half turn in a direction opposite to that of the first half turn and move along the original line, but in the opposite direction.

CIRCLING.

§ 22. *To circle to the right or left.*—Describe an arc as indicated in the preceding section 21, but make a complete instead of a half circle.

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REINING BACK.

§ 23. *To rein back.*—Lean the body slightly to the rear, rest on the stirrups, relax somewhat the pressure of the legs, and tighten the reins sufficiently to cause the horse to begin to move backward. If the horse throws its haunches to the side, thus changing the original direction, close the leg on that side. In reining back, the reins must be used gently and quietly, from time to time yielded and again tightened, if the horse requires it, but never jerked. The horse should not be reined back more than 6 paces, as the movement is difficult for horses.

§ 24. *To halt after reining back.*—Yield the reins slightly and remain still; to move forward, in addition to the above, close the legs strongly enough to cause the horse to move forward.

TO PASSAGE.

§ 25. *To passage to the right from a halt.*—Turn the fore part of the horse somewhat to the right, close lightly the right leg and give an impulse with the left; if the fore part moves too hastily and the haunches remain, *i. e.*, if the horse turns to the right, carry the bridle hand somewhat to the left and increase the pressure of the left leg; if the horse begins to back, close both legs simultaneously and continue to act as above described.

§ 26. The same rules apply to the passage to the left, but in reserve order.

As passaging is generally unnatural and difficult for horses, it should not be used for more than 5 or 6 paces.

To passage to the right or left at a walk.—Make a half turn to the side toward which the passage is to be made and use the reins and legs as above,

Having passaged as far as necessary, the rider either stops and straightens the horse, or ceases the side movement only and goes straight in the new direction.*

RIDING AT A TROT.

§ 27. *To pass from the walk to the trot*, the rider closes the legs or gives light blows with them according to the sensibility of the horse; to move forward at a trot from a halt, the rider acts as stated in § 9.

* The rules for passaging are given here in order to make the execution of this often indispensable movement better understood.

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The rider should preserve a correct seat at the trot and see that the motion of the horse is quiet and smooth and that there is no deviation from the proper direction.*

§ 28. To pass from the trot to the walk, the rider leans backward somewhat, bears more weight upon the stirrups without rising in them and at the same time tightens the reins sufficiently to bring the horse to a walk, then yields the reins and resumes his original seat.

§ 29. To halt from the trot, the rider follows the rules of the preceding section, except that the reins must be drawn tighter and yielded when the horse stops without permitting him to back.

§ 30. The turns at a trot are made in the same manner as at a walk with the exception that at a trot the body is thrown more to the side of the turn and the rider bears more weight on the inner stirrup.

RIDING AT A CANTER.

§ 31. Although the canter is not essential as an independent gait for Cossack troops, yet on account of their orderly, guard and reconnaissance service, and also because some horses are unable to trot fast enough (12 miles per hour) and are obliged to canter, a knowledge of this gait by the Cossacks appears necessary.

To move forward at the canter, the rider should tighten the reins, give a short and sharp impulse with the legs, and at the same time yield the reins and permit the horse to move forward freely at the canter, without allowing him to go at the full gallop. If the horse does not pass to the canter at once, the rider must make it take that gait from the trot. He should not tug and tear at the reins but use them gently, giving short but vigorous blows with the legs until the horse takes the required gait. If the horse does not obey the legs, it may be forced to take the canter by flourishing the whip. Riding at the canter must be cultivated to such a degree that the rider can quietly and deliberately use his arms at this gait.

*In riding at a trot for a more or less considerable distance it will be made easier if the rider, instead of bearing his weight continually upon the stirrups, lightly raises and lowers himself in the saddle in conformity with the horse's motion. The bolder the trot and the more the horse is supported by the reins, the easier the trot both for the horse and the rider.

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In passing from the canter to the trot, walk, or halt, the same rules are observed as from a trot, except that the reins are tightened more and the body inclined farther to the rear.

TO RIDE AT A GALLOP.

§ 32. To pass from the trot, walk, or halt, to the gallop, the rider tightens the reins somewhat, then quickly yields them and simultaneously gives a short but vigorous impulse with both legs, forcing the horse to the full gallop; if the leg action is met unwillingly and backwardly, one or two blows of the whip should be used. From the beginning of the movement, the rider, rising a little in the stirrups, leans his chest somewhat forward and clasps the horse more closely with the legs, never loosening the clasp of the knees.

To pass from the canter to the gallop it is necessary to give the horse its head sufficiently and by an impulse from both legs or a blow of the whip force it to the full gallop.

To pass from the gallop to the canter, trot, or walk, the rider bends the body backward and, bearing more weight on the stirrups, reins in, holding the horse back sufficiently to cause it to take the required gait; when it has done so, the reins are again yielded and the horse controlled with a steady, but light, support upon the bit.

In order not to injure the horse by the strong reining in required, the halt from a full gallop should be avoided. It is best to pass previously to the canter, trot, or walk, and then to the halt; but if it should be necessary to halt directly from the full gallop, the rider must rein in sufficiently to stop within a distance of 12 to 16 paces. In this case, even more than in others, it is necessary to lean backward, bear more weight on the stirrups, settle down in the saddle, and clasp the horse more closely with the legs, in order to sit more firmly in the saddle, and, freeing the horse in front, facilitate its halting. Having stopped the horse, the reins should be yielded so as not to allow it to back.

JUMPING DITCHES, FENCES, AND OTHER OBSTACLES.

§ 33. In jumping, the rider should keep a firm seat, lean backward, and not worry the horse with the reins, but give it its head.

In jumping a barrier (high jump) the horse should rise higher in front and rest more firmly on the haunches than in

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jumping a ditch or waterway (broad jump); therefore, in the high jump it is better to go at half speed and in the broad jump at full speed for a number of paces before reaching the obstacle.

The rider should always use the reins to guide the horse up to the obstacle, and when immediately in front of it yield them sufficiently to permit the horse to fully extend its neck and jump without hindrance from the reins.

To jump a barrier properly, the rider should have a correct seat, and, at about 3 paces in front of the barrier, should press his thighs and knees more firmly to the saddle, and, immediately before the jump and during it, lean backward a little; after the jump the original seat and gait should be taken immediately.

In jumping a ditch or waterway the rider should not lean backward as much as in a high jump.

CLIMBING OVER OBSTACLES.

§ 34. The Cossack should be able not only to freely, easily, and skillfully jump the various obstacles, but also to make his way over such as can not be jumped.

Easy slopes should be ascended and descended in a straight line, but when higher and steeper, in an oblique direction and only at a walk.

In climbing a hill the rider should bear upon the stirrups, lean forward, and grasp the mane with the hand, but not pull upon the reins nor tighten them; in descending, lean backward, close the knees to the saddle, and firmly bear upon the stirrups, but yield the reins, so that the horse can freely lower his head, as this facilitates the descent of steep slopes.

LONG-DISTANCE RIDES.

§ 35. Before being ridden a long distance the horse should be hardened by suitable daily rides.

To keep a horse in good condition during long-distance rides the following must be observed:

In moving forward from a halt, not less than one verst (0.66 mile) should be passed at a walk; after that the gait should be alternated and the change of gait made at the proper time.

To march at the rate of 8 versts an hour, not counting halts, the gaits must be changed thus: 1 verst (10 minutes), walk; 1 verst (5 minutes), trot; 1 verst, walk; 1 verst, trot, etc.

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To make 9 versts an hour; 1 verst (10 minutes), walk; 2 versts (10 minutes), trot; 1 verst, walk; 2 versts, trot, etc.

Ten versts an hour: ½ verst (5 minutes), walk; 2 versts (10 minutes), trot; ½ verst, walk; 2 versts, trot, etc.

Before a long halt and before the end of a march, 1 verst should be made at a walk and not less than 1 verst by leading the horse by the reins.

Halts should be made as follows: Short ones, from 5 to 10 minutes, at the end of the first hour, and then whenever they appear necessary to men and horses; long ones when half the march is completed; if the length of the march is unknown, there should be a halt lasting three hours after four or five hours of marching.

CHAPTER III.—RIDING OVER DIFFICULT GROUND.

(*a*) SOFT AND STONY GROUND.

§ 36. In riding over soft ground into which the horse continually sinks, the march is tiresome and the reins should be oftener yielded, but never thrown down, and the horse should never be hastened.

In riding in the dark or over stony and uneven places, the horse should be guided with the reins more than usual, but not so as to interfere with freedom of movement.

(*b*) PRECIPICES.

§ 37. In riding along steep declivities, the rider should bear more weight on the stirrup opposite the declivity and lean more to the same side; the reins should be yielded so that the horse can pick his way.

(*c*) NARROW PLACES.

§ 38. In riding along narrow roads, footpaths, embankments, or bridges, the rider should quiet his horse according to its temper to inspire confidence and boldness; then closing his legs he causes the horse to move forward in the proper direction, yielding the reins and endeavoring not to disquiet the horse either by the use of reins or legs; at the same time he must be prepared to prevent by their use any attempt of the horse to deviate from the proper direction. Sitting in the

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saddle as quietly and evenly as possible the rider should always be ready to dismount in case of necessity.

(*d*) SLIPPERY SURFACES.

§ 39. In riding on slippery surfaces, the rider should yield the reins sufficiently to permit the horse to plant its feet in the firmer places, but at the same time should be able to use them to support the horse in case of necessity; the legs should be kept in the same position as when riding along narrow ways, and the rider's every effort should be directed to sitting as lightly as possible in the saddle.

Side movements, steep slopes, short turns, and rapid gaits should be avoided on slippery ground. Irregular motions of the body should also be avoided, as they increase the unstable position of the horse.

(*e*) FORDS.

§ 40. In fording streams, take a direction to a point on the opposite bank somewhat up stream; the horse should be managed by a short rein and pressure of the legs to diminish the danger of falling due to stones or irregularities of the bottom. The rider should not look at the water, as this may easily make him dizzy.

(*f*) BOGS.

§ 41. If it is necessary to cross a bog, then, after deciding upon the direction to take, allow the horse perfect freedom in the choice of places to plant its feet. If the horse does not stop, the aid of the legs is superfluous. To lighten the burden, the rider should grasp the mane with one hand and rise in the stirrups.

If the horse sinks, becomes restless, and tries to get out of the bog by plunging, the rider should dismount as soon as possible, quiet the horse, and lead it by a long rein to more solid ground.

CHAPTER IV.—RIDING VICIOUS HORSES.

(*a*) WEAK AND BROKEN-DOWN HORSES.

§ 42. Horses with weak backs and broken-down front legs should be ridden with great attention and care, especially on uneven ground. The reins should always be in readiness.

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A horse stumbling from weakness should be supported by both reins and legs, but if the stumbling is caused by inattention the horse should be reined in more sharply and forced to be more attentive by blows of the legs or even of the whip.

(*b*) SHYING HORSES.

§ 43. Shying horses must be treated patiently and indulgently, but firmly. If the horse shows fear of an object, the rider should try to quiet it and encourage confidence by a caress; and then, by closing the legs, ride straight up to the object, guiding by a light rein, and not allowing the horse to jump aside.

The inclination of the body in this case should be somewhat to the rear, which facilitates the forward motion of the horse and makes it possible for the rider to sit more closely and firmly in the saddle. The nearer the approach to the object the more necessary it is to quiet the horse and close the legs more strongly to prevent turning.

If the horse is evidently obstinate and not afraid it should be punished with the whip.

When the horse has passed by or approached the object which excited fear, approval and encouragement should be given with the voice and by caresses.

(*c*) BLIND OR ONE-EYED HORSES.

§ 44. In riding a one-eyed horse, the rider should pay strict attention to the side on which the horse can not see, and should beware of turning shortly to that side or of approaching from that side obstacles which the horse must jump.

(*d*) UNRULY HORSES.

§ 45. If a stubborn or unruly horse has to be ridden it should not be irritated nor too much excited. Such a horse should be allowed to bear more on the reins. Arousing a feeling of antagonism to the rider should be avoided by all means, as in such a case it is impossible to master the horse either by strength or skill.

(*e*) FALLS.

§ 46. If the horse falls in front, the rider should lean back and aid it to rise by a quick reining in, at the same time quickly closing the legs. The degree and the manner in which the horse should be assisted always depends upon its

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sensibility to the reins and the speed at which it was moving, as well as upon many other considerations.

If the horse starts to fall to the side, the rider, with all his strength, should endeavor to support it by the reins and legs, at the same time leaning to the opposite side.

If the horse in jumping a water way should fall into it with the hind legs, the rider, leaning his whole body forward, should loosen the reins and give the horse a blow with the whip. If the horse fails to clear a fence with the hind legs and comes down upon it, the rider should dismount as soon as possible, in order to free and quiet the horse.

CHAPTER V.—JIGITOFKA.

§ 47. Jigitofka assists in the development of boldness, skill, dexterity, hardihood, *i. e.*, horsemanship, and therefore practice in jigitofka is indispensable to every Cossack.

Fig. 20.

Absolute rules for the execution of the various exercises can not be given, as each Cossack executes them according to his constitution, strength, and individual skill, as well as according to the disposition and qualities of his horse.

§ 48. The most generally practiced exercises in the Cossack jigitofka are as follows:

(1) Galloping (jumping) over obstacles in conjunction with shooting and cutting. (Fig. 20.)

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(2) Picking up an object from the ground. (Fig. 21.)

In this exercise the bending down should not be too quick and impetuous, as this often causes the horse to fall.

Fig. 21.

The descent of the body should begin when at several paces from the object on the ground, the rider previously moving toward the cantle.

(3) Taking up a comrade on foot.

Fig. 22.

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This exercise consists in the rider's taking on the saddle or on the croup of the horse, behind the saddle, a companion who is on foot; to do this, he can, for example, stand on one stirrup and leave the other at the disposal of the one who is to be taken on the horse, etc.

(4) Carrying off the wounded by one or two riders. (Fig. 22.)

In this exercise, the rider alone, or with the assistance of a comrade, seats or lays the wounded man upon his saddle, and then, mounting behind, supports him and manages the horse.

(5) Dismounting and mounting at a gallop.

Fig. 28.

In this exercise it should be borne in mind that, as far as possible, the feet must be planted well to the front and to the side of the horse. (Fig. 23.)

(6) Changing from a halt to a gallop.

(7) Galloping on two horses and three horses and passing from one to the other.

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(8) Galloping in groups. (Fig. 24.)

Fig. 24.

(9) Galloping standing. (Fig. 25.)

Fig. 25.

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(10) Galloping head downward. (Fig. 26.)

Fig. 26.

(11) Galloping with changing seats facing to the front and rear. (Fig. 27.)

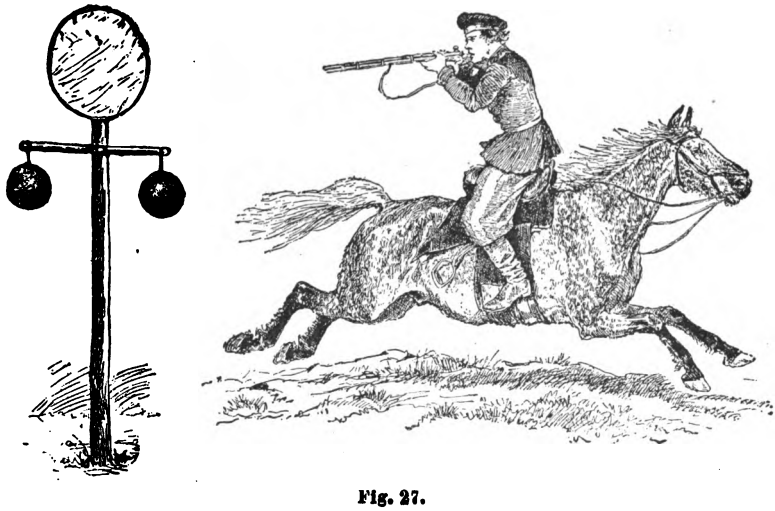

Fig. 27.

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(12) Unsaddling the horse at the gallop.

(13) Throwing the spear and other equestrian games calculated to develop horsemanship and the skill and cleverness of the rider. (Fig. 28.)

Fig. 28.

Throwing the spear is done as follows: The spear (a kind of short lance not more than 5 feet in length) is thrown while at a gallop at targets placed at various distances, such as rings or shields covered with paper, balls, and other objects, which are to be knocked off or pierced by the accurate flight of the spear. (Fig. 29.)

§ 49. All Cossacks can not be required to perform all the above exercises, as their abilities in this direction are not equal; but they must be encouraged to show skill, cleverness, and boldness in those exercises which are suited to them and which they undertake from their own choice.

For jigitofka, smooth ground should be chosen; but it should be neither slippery, hard, nor stony.

§ 50. Besides the above exercises, there is also a jigitofka to show the training of the horse and ability to manage it.

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In this the rider must show the greatest skill in handling his horse, and the horse must display dexterity, agility, boldness, and obedience to the will of the rider and to the reins.

§ 51. The exercises illustrate the management of the horse in quick, but bold and free, movements; the seat of the rider must be perfectly easy and correct, and the horse must be handled with a light and short rein. The horse, on its part, must be patient, spirited, obedient to the reins, with head carried freely and firmly and looking straight to the front.

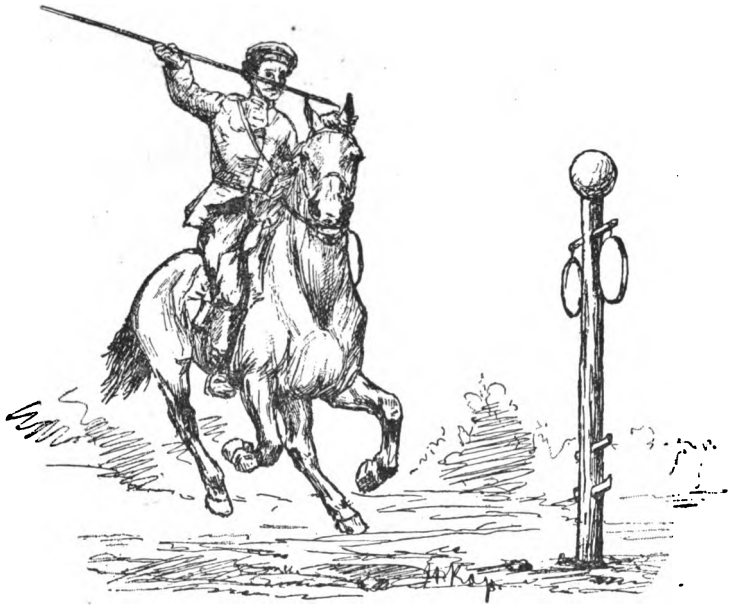

Fig. 29.

All movements must take place in a distance of 30 to 40 paces, and each exercise from a halt; the horse should be able to easily stop instantaneously and evenly on all four feet, and the fewer the motions of the rider the more skillful and higher the riding is rated; therefore superfluous cracking of the whip or aimless agility in the saddle should be censured.

All startings of the horse should be executed by an imperceptible, but vigorous, closing of the knees; and sharp turns, upon the track of the hind feet, by a slight bending of the body to the side of the turn and by a scarcely perceptible movement of the bridle hand.

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Greater elegance in such riding may be shown in various ways, *e. g.*, stopping the horse when at full speed by a light, quiet rein and a smart flourish of the whip raised at arms length; stopping him in the same way upon the summit of a hill after he has jumped there, or by instantaneously turning the horse and descending headlong at the charge, etc.

CHAPTER VI.—HUNTING OVER ARTIFICIAL TRAILS, AND THE GAME OF FOX.

§ 52. Where the hunting of wild animals is impossible, either from the scarcity of animals or the want of suitable ground, it may be replaced quite successfully by the use of artificial and paper trails.

§ 53. For hunting on artificial trails, dogs are indispensable. This has much in common with the actual hunting of wild animals. The only difference is that the dogs, instead of hunting animals, follow a trail over which a lure has previously been dragged. The lure may be a piece of fresh meat—the skin of a hare or fox, slightly smeared with anise oil; straw or matting, soaked with the urine and dung of the fox; a few herrings, tied together and placed in a net. A lure once chosen should not be changed, as the dogs, accustomed to it, would be apt to be thrown off the trail which they should be trained to follow. The lure should be dragged so it will not jump from the ground, *i. e.*, there should be an uninterrupted trail. Where it is desired to stop or to break off the trail for a time, the lure should be raised from the ground.

The slower the lure is drawn, the plainer will be the trail and the more rapidly the dogs will go, consequently the faster will be the hunt; but, if the lure is dragged at the trot or canter, the trail will be less plain, the dogs will go slower, and the hunt will be at less rapid gaits. Thus the speed at which the lure is drawn makes it possible to have the hunt at more or less rapid gaits, as may be desired.

The hunt along such a trail is conducted as follows: The master of the hunt, having selected beforehand a suitable place, orders the lure drawn over it. The time of beginning the hunt should be so regulated that the man with the lure shall have finished dragging it before the dogs are loosed upon the trail.

In order that the trail may remain fresh, the lure should be drawn over it shortly before the hunt begins, but the dogs

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must not be allowed to see the one who drags it, else they will always dash after him instead of following the trail. At the point where the hunt should terminate, the man who drags the lure raises it from the ground, scatters about a few pieces of meat, and then stations himself in the vicinity, but in a place where he can not be seen by the dogs.

Those who take part in the hunt meet at the appointed time at the place where the hunt is to begin. There, by order of the master, the dogs are loosed on the trail, and those participating in the hunt, having let the dogs get about one hundred paces in advance, gallop after them, surmounting or passing all the obstacles encountered, but observing due care not to crush or maim the dogs.

The first hunts of this kind should not be for long distances, beginning, for example, with two versts; the ground chosen should not be too rough, and the trail laid out should preferably be a straight one with insignificant windings and turnings. For later hunts the ground chosen should be more cut up, having more or less serious obstacles, and the hunts should cover greater distances and be at faster gaits. In selecting the place the master of the hunt should always have in view a choice of ground and obstacles suitable to the strength and qualities of the horses to be ridden.

THE PAPER CHASE.

§ 54. Hunting on a paper trail may be preferred to that on an artificial trail, because dogs and those complicated adaptations connected with the laying out of an artificial trail are not required; but it does not arouse in the participants as much enthusiasm and passion as hunting with dogs.

The paper chase is conducted as follows: The master, having previously chosen a place, takes with him a man, provided with a bag of finely-cut paper, and orders him to scatter this paper along the path on which he wishes to lead the party. If there are insufficient natural obstacles along this path, artificial ones are set up.

At the end of the ground chosen for the hunt, a row of obstacles is placed, near which is concealed the man who represents the fox.

When the paper trail is laid and all is in readiness, the master takes the huntsmen to the starting point and, after placing them, endeavors to lead them on the paper trail.

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The first one to find the trail gives notice by sign or signal to the others, and all follow it, at first at a trot, and then by commands of the master, successively at the "trot out" and canter, depending on the length of the hunt. When the party arrives at the obstacles at the end of the trail, the rider who represents the fox emerges from ambush and starts from the last obstacle at a full trot or canter. All the party then put their horses at full speed and passing over all obstacles endeavor to catch the fox; the first to seize the horseman (the fox) by the hand or by something tied to him (the brush), within a distance previously designated by the master, is considered the victor, or winner of the prize.

The choice of a place for a paper chase and the laying out of the course depend upon the same considerations as in the case of a hunt on an artificial trail. A calm day should be chosen for a paper chase, otherwise the trail markings are scattered by the wind and the hunt becomes very difficult, if not quite impossible.

THE GAME LICITCHKA (LITTLE FOX).

§ 55. This game without a paper trail is as follows: The rider who represents the fox sets out a few minutes in advance, and in view of the whole party riding in the hunt; then, at a signal from the master, the chase of the fox begins at a designated gait, and the huntsmen take the obstacles encountered on the way, unless one is met with which can not be jumped, in which case they climb over or ride around it; the hunt continues until the fox is caught or until the master gives the signal to stop.

This game may also be conducted in the following manner: The rider (the fox) rides about half a verst to the front, and the huntsmen, with the master at the head, go after him. In this case both the party and the fox conform to the gait of the master. Having gone a certain distance the master gives the signal for beginning the race after the fox; this race continues until the fox is caught or the hunt is terminated by the master.

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PART II.—THE TRAINING OF COSSACK HORSES.

CHAPTER I.—THE OBJECT OF TRAINING AND ITS NECESSITY.

§ 56. The Cossack horse should be strong, gentle, obedient, and trustful. It should be an agile and bold jumper, have good and full gaits, be inured to work, and, as far as possible, fearless.

§ 57. When Cossacks enter the service they always bring their own horses, which are in most cases bought directly from a herd and are almost entirely unbroken. To subject the horse to its rider's will, preserve its good natural qualities and develop those which are indispensable in service, it must be treated properly and ridden patiently without at once exacting requirements which are unfamiliar and which the horse is perhaps unable to execute.

§ 58. In many eastern nations the horse-breeders have their own methods for breaking young, unridden horses, for accustoming them to the saddle and rider, and for their further training. But these rules are adapted to the use of skilful riders only, and in unskilled hands are liable to injure horses and make them vicious, unruly, and unsuited to the military service.

The following methods prevent injuries and are suited both to the first stages and to progressive training in the course of service:

GENERAL RULES FOR THE TREATMENT AND CARE OF HORSES.

§ 59. Horses in general and young ones in particular, whether in the stable or under the saddle, should always be boldly, but cautiously, kindly, and quietly treated; for thus only can a horse be made trustful, quiet, and obedient. The Cossack should know the habits and good and bad qualities of his horse. Severity and punishment with the whip should be avoided except in extreme cases as a last resort, and should then be administered without anger and only when there is no doubt that the horse refuses to obey through obstinacy. It should be remembered that untimely and unmerited blows spoil and exasperate a horse, and if habitually given render it insensible and inattentive to them. To accustom the horse to

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man and develop greater obedience and trustfulness, it is useful to reward the exhibition of these traits by petting and a gift of oats or bread. In abundant forage and intelligent care, the Cossack has a powerful means for subjecting his horse to his will and accustoming it to him.

§ 60. To preserve health and develop strength, there should be, in addition to good and sufficient forage, a horse pond (watering place), exercise, and fresh air and light in the stable. The Cossack should endeavor to ride every day, getting away from the dark stable, and should attend carefully to the cleanliness and ventilation of the stable and see that there is sufficient clean bedding in the stall.

CHAPTER II.—TRAINING.

GENERAL DIRECTIONS.

§ 61. To develop natural strength and abilities and fully subject the horse to the rider's will, the training should be progressive and patient, passing insensibly from the easy to the more difficult stages.

Moderation in requirements is essential and must be observed with special strictness in the beginning, as every young and partly unformed horse may very easily be spoiled in a variety of ways on account of natural timidity, ticklishness, and softness. The first requirements should therefore be not too great for its understanding and strength.

A young horse should not be ridden more than once a day and not beyond a light sweat. Strong and refractory horses may be ridden twice a day, but with the same restriction. If a young horse ridden daily is quiet and gentle and shows signs of weakness, it should be given a rest for a day or two, changing the ride to a leading about for exercise.

Young horses, especially at first, should not be ridden a long time or until they are exhausted. This rule must be observed to keep up their strength and to avoid arousing a spirit of disobedience, which is more frequently due to weakness, fear, and ignorance of what is required, than to obstinacy or ill nature.

The first requirements of the rider are usually either not executed at all or executed improperly; in either case, the failure is almost always due to misunderstanding or ignorance on the part of the horse. The rider should therefore limit

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his requirements at first and try to make the horse understand what is wanted, if possible putting it in such a position that it can not help executing the required movement. If what is wanted is understood and even partially executed, this should be satisfactory for the first few times and the horse immediately rewarded by petting, a handful of oats, a small piece of bread, or, better still, by ending the lesson.

Few horses will immediately or even very soon execute all the requirements of the rider, but there are very few that can not be fully subordinated to his will in course of time. It is only necessary to be attentive, cautious, cool-headed and patient, and to make the rides and work commensurate with the horse's strength.

PUTTING ON THE BRIDLE AND SADDLE.

§ 62. As it is often necessary, especially in time of war, to saddle in great haste and under a great variety of conditions, the horse should be trained to stand quietly while being saddled and bridled.

In most cases, horses afraid of being saddled and bridled have been frightened in youth by carelessness and rough handling. Remembering this, the Cossack should be very careful never to strike or frighten the horse when putting on the bridle and saddle.

§ 63. The bridle should be put on quietly and without haste or confusion while petting and encouraging the horse. The bit should be adjusted so as to lie on the toothless part of the gums, approximately a finger's breadth lower than the corners of the mouth. If too low, the bit shakes and the horse may acquire the habit of throwing the tongue across it; if too high, it rubs the corners of the mouth, continually frets the horse and may scratch and tear the corners of the mouth.

The headstall should lie on the back of the head without touching the ears; the brow band, close to the forehead, under the ears, but so as not to rub them; the cheek straps should follow the cheek bones straight to the corners of the mouth and the strap across the bridge of the nose should be three-finger breadths higher than the corners of the mouth; the chin strap should be buckled so that two fingers can be freely inserted.

The best place to accustom a young horse to the bridle and to bridling is the stable, and this task should be intrusted to

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the man who takes care of and feeds the horse. If the young horse will not permit the bridle to be put on, one or two men should lead it by the halter, or by a rope with a running noose, to a level, inclosed place and quiet it as much as possible by petting. The man who is to put on the bridle then takes it in his left hand, with the ends of the reins in his right, and straightens the headstall to its full breadth with the fingers of the left hand, palm down. Avoiding sharp motions, he brings the bridle in front of the horse's head with the bit touching the lips; then, stroking the head of the horse with the right hand to quiet it, he presses the index finger of that hand into the toothless part of the lower jaw, forcing the horse to open its mouth. When the mouth is opened the bit is inserted, the left hand being raised as much as necessary. After giving the horse a little time to become familiar with the iron in its mouth, the headstall is put on, the ears being quietly and carefully bent, and care being taken that the bridle does not touch the eyes or strike the head of the horse. After buckling the chin strap, the horse should be led about.

If the use of the above means is not successful, two men take the horse by the ears and hold it while a third puts on the bridle, inserting the bit by force with the aid of the right hand; but sharp motions which would frighten the horse should not be made, nor should pain be caused by the bridle or bit.

In the first bridlings, especially in the case of a wild horse, the bridle should be put on over the halter, which is left on.

§ 64. In saddling a young horse for the first time, three men are necessary, two of whom stand facing the horse on the right and left sides, holding it at the chin, the one on the right with the reins in the right hand and the one on the left with the lariat or halter strap in the left hand. These men are charged with holding and quieting the horse.

At first the third man approaches several times without the saddle, stroking the horse along the back and belly, and then with the saddle, which he holds by the pommel with the right hand, the left supporting the saddlecloth. The girths and the right stirrup must be thrown across the saddle so as not to shake and the left stirrup put up on the cantle. Approaching on the left side, the man with the saddle quiets the horse and slowly and carefully places the saddle upon its back, without letting go of it. If the horse jumps or throws itself to the

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side, the man raises the saddle and, holding it suspended, quiets the horse. If the horse takes the saddle quietly, the man withdraws his left hand from under the saddle and grasps the pommel with it; then, with the right hand, after patting the horse, he takes down the girths and passes the middle one (the shadrack girth) to the man on the right, who in his turn carefully passes it under the horse's belly to the first man, who first tightens it against the horse's belly and then, if the horse tolerates the girth, buckles it. If saddling without the saddlecloth, the front girth is passed. In the same manner the two remaining girths are passed and tightened, but they must not be too tight, nor yet loose enough for the saddle to turn. After saddling the horse it should be led about for a little while, but should not be mounted after the first saddling.*

In unsaddling, the girths must not be loosened suddenly, but gradually, and the saddle should be removed with all possible care in order that the horse may not be frightened.

MOUNTING AND DISMOUNTING.

§ 65. To accustom a young horse to stand quietly while being mounted, the rider approaches quietly but boldly on both sides, pets the horse and pats the fore shoulder, the saddle, and behind the girths; he then grasps the mane, pulls down the stirrup, and, taking hold of the pommel and cantle, gently rocks the saddle back and forth. If the horse begins to show great uneasiness and to snort, the rider must patiently quiet it by a caress and with the voice.

To mount a young horse for the first time, and generally in the early stages of training, one man takes hold of the halter shank or tether and, standing a pace in front of the horse, looks it straight in the eye and soothes and quiets it with the voice; another man, standing on the right side, holds the reins in the right hand at the horse's chin and with the left grasps the right stirrup leather, which he pulls strongly downward while the rider mounts by the left stirrup, in order to keep the saddle immovable. Both of these men watch the

*To accustom a young horse to the saddle, it is very useful, before resorting to the saddle, to put on the cloth, fasten it with the girth, and walk the horse about. Every precaution should be taken in saddling a young horse that the saddle shall never fall nor turn under the belly. Such an occurrence might make a horse afraid of the saddle for life. At first the saddle may be used without the saddlecloth.

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horse attentively and endeavor to keep it in place and prevent any attempt to throw the rider. The man who mounts takes the reins and the mane in the left hand without tightening the reins too much, carefully places the left foot in the stirrup, grasps the cantle or blanket with the right hand, and cautiously rises in the stirrup; he then lightly passes the right leg across the back of the horse and gently and quietly lowers himself into the saddle so as not to hurt the horse's back.

In mounting, the reins should not be jerked nor the horse struck in the sides with the legs. It should be understood that a horse which has been frightened by ignorant and rough climbing on and off usually objects to being mounted. Should the horse throw the rider, it must be quieted and an effort invariably made to remount.

At first the rider should not remain on the horse a long time, to avoid fatiguing it and arousing a feeling of opposition to carrying a rider, which might easily become a habit.

§ 66. In dismounting from a young horse for the first time, it is necessary to observe the same caution and to make use of the same men as in mounting. It is essential to dismount as quickly as possible and without bustle, so that the horse may not become uneasy. After dismounting, the horse should be petted.

ACCUSTOMING THE HORSE TO THE MOVEMENTS AND ACTIONS OF THE RIDER.

§ 67. As soon as the horse is entirely familiar with the weight of a rider sitting quietly upon its back, it must be accustomed to the various movements and actions of the rider in the different exercises of the Cossack service.

These exercises include rising and depressing on the stirrups; turning the body to different sides; bending to the right, left, forward, and back; dismounting and mounting from both sides, etc.

It is impossible to give in detail all the rules and methods for training the horse to be perfectly quiet and fearless in all the movements and actions of the rider; but the essence of all these rules and methods lies in the kind treatment of the horse, in the rider's knowledge of its temperament, and also in his presence of mind and tact. By progressiveness, patience and caution, it is always possible in the end to break and render submissive, even those horses which in the beginning were the wildest and most vicious.

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THE ACTION OF THE REINS.

§ 68. The action of the reins should be such that the horse's mouth continually feels an even pressure of the bit. This pressure, depending on the rapidity of the horse's motion, is sometimes increased and sometimes decreased, but should always be controlled by the slightest action of the rider's hand. If the horse is not sensitive to the action of the bit, it is called hard-mouthed, and if too sensitive to such action, it is called soft-mouthed. For hard-mouthed horses a thinner (severe) bit should be used, and for those that are tender mouthed a thicker one.

The reins should be used gently and evenly, without jerk, and should be quietly tightened or yielded according to the sensibility of the horse's mouth, the rapidity of the gait, and to what is required of the horse.

It must be understood that most of the bad riding horses met with among the Cossacks are the result of a rough and ignorant use of the reins.

RIDING AND TURNING.

§ 69. In the training of young horses, the riding at different gaits, the turns, halts, and reining back are executed according to the rules given in Part I of this Manual.

True and long continued gaits, and the exact and regulation execution of turns and movements should not be required at the outset. The real aim of the training is to completely subject the horse to the rider's will and to the reins, to develop easy, smooth, and full gaits, agility and receptiveness. This can only be accomplished by intelligence, patience, calmness and coolness, and by progressive demands upon the young horse.

The training should begin at the slow gaits, preferably in straight directions. When the horse is familiar with and masters them, then pass to the fast gaits, at first from the slow ones and afterwards directly from a halt. Then take up the turns.

§ 70. The natural training of a young horse in the field may be conducted approximately by the following steps:

When the young horse is familiar with the saddle and will quietly permit the rider to mount and dismount, and is also familiar with movements to the front under the rider, then free riding may be proceeded with.

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During the first days the horse should be ridden in straight directions, exclusively at a walk, and not more than an hour a day. Accurate and smooth movements should not be required, the horse should not be fretted by the reins, legs, or body, and every possible means should be used to avoid creating an unfavorable impression upon it, or tiring it and developing an unwillingness to go under the rider. On the following days, while continuing to ride at a walk, the horse may be gently stopped, reined back two or three paces, and then moved forward, repeating the exercise about four times during the ride; on the same days the turns may be taken up and two or three, not too short ones, to the right and left may be made during each ride.

Then continue the rides in the same order, adding every day one or two halts, advances and turns. When the horse has sufficiently mastered the walk, take up the trot, and quietly halt from that gait, after passing to the walk; after halting, move forward at a trot; continue the ride alternately at the walk and trot, then take up the turns at a trot and the halt from a trot. When the horse is familiar with the trot, the first exercise at a canter may begin. The horse should pass as smoothly as possible from the trot to the canter, which is accomplished by means of a gentle reining in and a pressure or light striking of the legs, according to the temperament of the horse. In the first exercise it is sufficient to compel the horse to make four or five bounds at the canter and then again take the trot.

After the horse is familiar with passing to the canter when in motion, that gait may be taken from a halt. To do this, rein in and close the legs or strike the horse with them, at the same time yielding the reins and forcing the horse to make a few bounds forward; then gently bring it to a halt. This exercise should be continued several days, adding two or three bounds each day.

When the horse has mastered this, the turns on a fixed and movable pivot may be taken up.

All subsequent exercises should be directed to the development of full and smooth gaits, to acquiring accurate, bold, and easy movements, and to forcing the horse to take the correct rein and to be fully submissive to the rider's will.

In the first lessons, a place should be selected where there are no bystanders, horses, or other objects to distract and frighten the horse.

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JUMPING.

§ 71. Young horses should be taught jumping by degrees, giving them at first low barriers and narrow ditches, and advancing them in proportion to their ability to take the low or narrow obstacles. (In the first lessons a straw obstruction should be placed directly on the ground.) The young horses should at first be taught to jump without a rider, which is done by the master himself leading his horse by the halter shank, or reins, to the obstacle and making it cross. If the horse crosses willingly and boldly, it should be petted and made much of. When the horse jumps boldly without a rider, it should be taught to jump with a rider. This exercise should begin with a single horse, and then progress until several horses jump one after the other at a few horse lengths distance. Loud exclamations of trainers and assistants should not be tolerated, as they only confuse and frighten the horses.

§ 72. The rules for jumping have been set forth in Part I. It should be specially remembered that nothing so facilitates the jump of a horse as a perfectly natural, firm, and quiet seat; and, on the other hand, nothing renders a jump so difficult and repellant to a horse as a jerking of the reins, incorrect and unreasonable striking with the legs, and blows of the body on the back, always caused in a jump by a rider not having a firm and quiet seat.

If the horse jumps well, it should be caressed, the rider even dismounting for that purpose; if poorly, the horse must be forced to try again until the jump is made as required.

Instruction in jumping should be given at the end of the exercises, but should not be so continued as to fatigue the horse, as that would make it capricious and arouse a dislike to jumping.

ACCUSTOMING HORSES TO ARMS AND FIRING.

§ 73. To accustom the horse to the side arm, the rider first of all allows the horse to see and smell it, and draws and returns saber in front of the horse a few times. In order that the horse may not fear the arm, it should be adjusted so as not to strike the sides and generally so as to disturb the horse as little as possible. In the course of time, when the horse is somewhat familiar with the noise and touch of the saber, the saber should be drawn from the scabbard. In drawing and

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returning the saber, and also in the exercises with the lance, it is necessary to begin gently and smoothly, so as not to frighten the horse by the different motions, and afterwards the arm may be slowly brandished and the cuts and points taken up by degrees.

§ 74. To accustom the horse to firearms, begin by snapping caps and then proceed to firing weak charges, gradually increasing the charge until it is of full strength. The man who does the firing stands 10 or 15 paces from the horse and fires in turn—up, out, and to the side. The rider, after each firing, soothes and encourages the horse, and moves it forward straight to the man who has fired, who also soothes the horses and gives it some oats, trying at the same time to show and get it to smell the firearm. In course of time, when the horse no longer minds this firing, begin to fire from its back, observing the sequence above indicated.

Horses once carelessly frightened by firearms nearly always remain incorrigibly timid and afraid of firing; therefore, in training them to stand firing, special carefulness and progressiveness are essential.

Training to stand firing and the beating of a drum is best effected in groups or details at the end of a ride. The riders surround the one who is firing or beating the drum and cause their horses to move a little toward him, soothing and encouraging them. After they have approached sufficiently near, the man who has fired, or another one near him, also soothes the horses and gives them a few oats, the riders dismounting.

§ 75. Horses must be taught not to fear stuffed figures, targets, and other objects. To do this, when approaching them in the first exercise, the horse should be soothed and encouraged, and ridden up to examine and smell them. The whip as a compelling means should only be used in extreme cases, and then with the greatest caution and prudence.

In accustoming horses to various sounds, such as firing, the beating of a drum, etc., it is very useful to have these sounds made near the picket line during grooming and feeding.

TEACHING HORSES TO LIE DOWN.

§ 76. To teach a horse to lie down, put on the snaffle bridle before feeding, and, standing on the left side, take the right rein in the right hand across the horse's back and as short as

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possible; with the left hand raise the left forefoot of the horse and then pull on the right rein. At the same time give the command "lie down." When the horse lies down, it must be immediately encouraged, and the nosebag with some oats in it put on, for which purpose these articles must be near at hand; having begun to eat, the horse will not rise. It should be unbridled either immediately upon lying down, or as soon as quieted. If the horse rises without eating the oats, the nosebag must immediately be taken off and the horse forced to lie down again.

In teaching horses to lie down, choose a place where the ground is soft. They should never be thrown, but so placed that they will not bruise themselves nor feel any pain, otherwise they will lie down with great reluctance, and some horses will refuse to lie down at all.

§ 77. It is indispensable to teach a Cossack horse to stand in place after the rider dismounts; to do this it is necessary to dismount from time to time during rides, and walking around the horse, soothe it; then go a little to the side, requiring it to remain quietly in place. If the horse leaves its place, take it quietly by the reins, without jumping at it, put it in place again and endeavor by caresses to make it stand there. In the first exercises do not go too far away from the horse; it is better to stand about, without holding the reins. In proportion as the horse becomes accustomed to stand alone, the rider can go away to more or less considerable distances.

RIDING IN THE FIELD.

§ 78. The object of field rides for young horses is to develop full and free gaits and to accustom them to execute all required movements, under as diverse conditions as possible, not only rapidly, skillfully, unconstrainedly and fearlessly, but also for long periods.

In field riding young horses should be accustomed to detach themselves from the ranks and from other horses freely and without hesitation. This is done by calling single riders from the ranks or from groups of other riders and ordering them to move forward, back, or to the side; by scattering those who are riding together, leaving them to ride separately; by rapidly collecting them; by causing them to ride in a circle, and generally by varying the ride as much as possible in order to accustom the horses to obedience and to bold, free

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movements to all sides, both together and individually; it is also necessary to cause the riders to dismount and mount and to require the horses to stand quietly at the time.

To accustom young horses to movements over various kinds of broken ground and also to accustom them to bear themselves fearlessly toward surrounding objects, and to develop in them skill in jumping and climbing over obstacles, there should be rides from time to time at the various gaits over plowed fields, fields covered with hay, and generally over a variety of cut-up ground, intersected by hedges, canals, and other obstacles. It is useful to terminate the ride by passing the ranks one through the other.

CHAPTER III.—TEACHING HORSES TO SWIM.

§ 79. Every Cossack horse should be able to swim, and, as hardly one of them will swim a stream voluntarily, especially if its current is swift, it is necessary to teach them.

Before attempting the swimming, the horses must be generally accustomed to the water, which may be accomplished by riding across fords 3 to 4 feet deep, and chosen, if possible, with hard but not stony bottoms.

To accustom horses to the water and to teach them swimming, it is necessary to take advantage of favorable weather, *i. e.*, to select warm and calm days.

In teaching swimming, a narrow stream should be chosen for the first exercises, with not too swift a current, as overcoming the latter is the chief and most difficult task for horses. Both banks for some distance should be sloping and hard, so that the horses, even if carried down by the current, can easily get out of the water.

The depth of the stream should be sufficient to prevent the hind legs of the horses from touching bottom, otherwise they become accustomed to seek the bottom, and in deep water, not finding the support, become restless and frequently sink.

§ 80. To force a horse to swim, it should be secured by a rope tied to the halter shank or to the rings of the snaffle bridle. The reins of the snaffle bridle should be tied around the neck, so the horse can not entangle its fore feet in them, but, at the same time, so it can freely extend its neck. The instructor, in a boat, holds the free end of the rope. The boat should always be up stream and about two horse's lengths from the horse. The rope should not be held so short that the horse

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will be frightened by the action of the oars, nor so long that it is impossible to yield it as occasion demands.

The unsaddled horse is then led as deep as possible into the water. As soon as it loses the bottom and drops into the stronger current it usually tries to turn back to the shore. This must be prevented by the men in the boat, who then begin to row strongly and thus force the horse, by the aid of the rope, to swim forward. As soon as the horse resumes the proper direction the instructor yields the rope and holds it gently, observing that the boat does not go faster than the horse swims and that the rope is never stretched.

Upon the opposite bank there should be several men to receive the swimming horses. This should be done without confusion or noise, and as kindly as possible.

When several horses have crossed to the opposite bank, to cause them to return, attach the rope to that horse only which swam unwillingly and worst and drive the remainder into the water; usually they will willingly follow this leader. In this exercise it must be borne in mind that a horse is more willing to swim to the opposite bank if it sees other horses there and is left alone on the bank from which it is required to swim.

§ 81. After a few exercises in swimming without riders the men should return from the opposite bank on the horses. They should either undress entirely or retain only their drawers and then mount the unsaddled horses and ride into the water.

As soon as the horse loses bottom the rider should stretch the body forward, extend the arms, and, without letting go of the mane, close the legs. Holding the mane with one hand he manages the horse with the other, by means of the reins, and either swims upon the horse or on the down stream side. Many skillful swimmers prefer to be on the left side of the horse. In swimming, the hands and feet must not be moved about, so that the horse may not be frightened and its swimming interfered with (fig. 30). When the horse strikes bottom the rider mounts again.

When swimming, the reins should be completely free. The rider manages the horse with one hand, by means of the reins, and with the other grasps the mane two handbreadths above the withers. This is important, as holding the mane higher or lower than the indicated place disturbs the equilibrium of the horse. In swimming streams the horse itself will, usually,

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choose a direction oblique to the current and, therefore, it will not be necessary to interfere with its choice of direction.

§ 82. When the horse has been taught to swim on the rope, free swimming from one bank to the other may be taken up, at first without the saddle and then with saddle and rider.

Fig. 80.

In crossing a stream, if the rider in the saddle observes that the horse lowers itself behind unexpectedly, so that the rider is deep in the water, or if, in consequence of loss of balance, the horse begins to throw itself back in the water, the rider should immediately grasp the mane, let go with his legs, and, raising the body, swim with the horse. He must do the same if the horse begins to roll or sink.

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§ 83. Some authorities recommend the following manner of swimming (fig. 31): The rider, holding the reins and grasping the mane with one hand, rests the arm, from elbow to shoulder, on the back of the horse a little below the withers, bending the arm at the elbow as much as necessary and pressing himself closely to the horse; with the other hand he makes quiet strokes, aiding the horse's forward motion as much as possible

Fig. 31.

If swimming with a saddled horse, the arm should rest on the middle of the saddle, and the hand grasp the mane or pommel.

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As the weight of the rider submerged in the water is not very great, and, in swimming with the horse which is deep in the water amounts to almost nothing, the weight of the rider on the back of the horse ought not to especially burden it if the rider keeps cool and quiet and does not interfere with the swimming of the horse by ineffective movements and strokes.

In swimming as above the rider can easily guide the horse, using either rein, according to the side to which it is desired to turn (figs. 32 and 33).

Fig. 32.

Fig. 33.

In swimming with the saddle it must be borne in mind that the middle and rear girths should be loosened sufficiently to allow the horse to breathe freely, but they must not dangle, else the horse might entangle its hind legs in them.

The method of holding on to the horse's tail in swimming is not a good one, as it requires a greater effort for the rider to keep himself above water and avoid strangling, and he is also unable to guide the horse and consequently to prevent its turning back.

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CHAPTER (IV) V.—SOME COMMON REMEDIES FOR CORRECTING THE BAD HABITS AND VICES OF HORSES.

GENERAL DIRECTIONS.

§ 84. The resistance shown in the training of young horses is almost always due to the following causes: Wildness and fear, superfluous fieriness, phlegmatic temperament, insufficient hardness, incapacity, and sometimes hidden disease, either of the whole system or of some part of it.

With the removal of these causes the resistance of the horse usually ceases; but if inattention, ignorance, rough and cruel treatment, or excessive and inconsistent requirements are the causes which produce the resistance, then as they increase so will the resistance of the horse increase, and in course of time a variety of bad habits and vices may develop which will often make the horse entirely unfit for service.

It may be truthfully said that if at first the bad habits and vices of a horse are often a part of its nature, the development and final confirmation of them are almost always due to man. It is true that man can not always remove the causes, which, hidden in the very nature of the horse, give rise to these faults, but in a great majority of cases he can and should find a means to prevent their breaking out and development. For this it is only necessary to have a knowledge of the character of the horse and of its natural deficiencies, and to give, in conformity thereto, intelligent, attentive, reasonable, and patient treatment in all cases.

To enumerate all the bad habits and vices of horses met with in their training is almost impossible; it is equally impossible to point out positively the best means to remove them. The only ones which are incurable come from permanent organic disease, either general or local; but it is difficult to cure such as are already strongly rooted. The most effective remedy for all of them is the one which prevents them and removes the cause. Such a remedy must strictly conform to the temperament, understanding, and strength of the horse. In curing bad habits and vices it is above all necessary (1) to accurately determine their real cause, (2) to choose a remedy suited to the temperament, understanding, and strength of the horse.

It is easy to spoil a horse by wrong treatment, but always slow and difficult to repair the damage. It is bad to jump

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from one method to another, and equally so to cling obstinately to a method once chosen; but because a method is ineffective at first it does not follow that it will continue to prove so. Once a method is selected, considered, and skillfully applied, time, care, and progressiveness in its application, often make it effective and produce the desired result. A method should only be changed when clearly shown to be unsuitable.

§ 85. The bad habits and vices most frequently met with in training young horses and the remedies generally applied are given below. But these remedies are not intended to replace those indicated by experience, practice, and skill obtained in the training of young horses. The use of cruel means should be strictly forbidden, as such means not only never cure vicious horses, but are shown by experience to spoil them still more.

(*a*) A DISLIKE TO BEING BRIDLED AND SADDLED.

§ 86. The cause is usually fright, ticklishness, or disease of the poll, gums, chin, back, or sides; and the first thing is to ascertain it, which may be done by an attentive and detailed examination. With the removal of the cause, and quiet, gentle, and kind treatment, the dislike to being bridled and saddled will usually disappear.

For hard-mouthed horses, as prescribed in § 68, a more severe (thinner) bit may be used; and a thicker one for those with soft mouths, due to sharp and very sensitive gums.

Ticklishness usually diminishes in proportion to the duration of the cause producing the sensation, but great care is generally required at first in the treatment of such horses, as they easily learn to bite and kick and may become bad tempered.

They should be approached boldly, but cautiously and not unexpectedly, and often petted and given a piece of bread. In grooming such horses it is better at first to use a wisp of straw instead of a currycomb. A ticklish horse should be kept longer under the saddle, the stirrups at first being crossed and afterwards lowered; the girths should not be too tight. It is well to feed such horses while they are saddled.

Generally, when a horse objects to being saddled and bridled, it should be shown a nosebag containing some oats, and at the same time the saddle and bridle, and allowed to smell them. If it permits the saddle and bridle to be

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put on, it should at once be allowed to take some oats from the nosebag or encouraged by the gift of a piece of bread. But it should be given nothing until it submits to being saddled and bridled.

(*b*) A DISLIKE TO BEING MOUNTED.

§ 87. The cause is usually weak back, bad saddling, or fright produced by carelessness in the first saddlings.

It is generally difficult to cure a horse when the cause is weak back and the consequent fear of pain due to riding. In riding such a horse the back should be carefully looked after to prevent permanent damage. A weak back often gets stronger with age, according to the virility of the horse, but that this may ensue it is necessary (1) not to be in haste to put on a rider, (2) never to put on a heavy rider, (3) not to ride a long time, especially at first, (4) to require the rider to lower himself as gently as possible into the saddle and to avoid a seat causing pain to the horse's back, and finally, (5) to put on the saddle with the greatest care and attention.

If the objection to being mounted is due to the girths being too tight, the pressure of the saddle, discomfort from the bad adjustments of breast strap or crupper, and, generally, bad saddling, the deficiencies must be remedied before mounting.

Bold, skillful and smart horsemen should be chosen for these horses.

(*c*) KICKING.

§ 88. This fault is usually due to a weak back, evil disposition, ticklishness, bad saddling, or excessive severity.

When the horse begins to show signs of kicking, the rider should sit lower in the saddle, lean back, and by strong action of the reins and even by jerks from below upward, raise the horse's head and then boldly urge it forward by the action of the legs or a blow of the whip on the shoulder. If another man is holding the horse by the halter shank or rope, he should help the rider to raise the horse's head.

If the trouble is a weak back, the above means should be used very carefully in order not to injure the back still more.

(*d*) REARING AND FALLING BACKWARD.

§ 89. An evil disposition is frequently the sole cause of these dangerous vices, but they are often due to the carelessness of the rider himself.

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If the hind quarters are weak and the mouth too sensitive, the horse is usually afraid of the action of the bit, and if the rider is inattentive to this and uses the reins carelessly and roughly, especially when mounting or reining back, the horse first rears to avoid the bit, and from a further tightening of the reins may even fall backward. Two or three cases of this kind are usually sufficient to confirm rearing and falling over into a habit which it is difficult to cure.

To cure this bad and dangerous habit, auxiliary reins may be used; these reins, attached to the front girth and passing

Fig. 34.

Fig. 35.

through the rings of the bit, are taken in the hand along with the reins proper (figs. 34 and 35). At first, the horse should be riden in a straight direction and only at a walk, and it is well to have another man holding the halter shank or rope. The rider should rein in slightly from time to time, trying to make the horse take the reins correctly. The man holding the halter shank follows attentively and immediately draws it toward him and downward as soon as he sees an indication of rearing. When the horse has become sufficiently familiar with the reins by this means, the assistant may be dispensed with and the ride continued in a straight direction and at the faster gaits.

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Such horses should be taught to back the last thing, and there should be a man to hold the halter shank or rope. The backing should at first be limited to one or two steps. The horse should be held by the halter shank until completely cured of rearing.

At the first motion of rearing the rider should instantly, and without bending forward, yield the reins and move the horse forward by a sharp blow of the legs or whip.

If it is known that the horse sometimes falls backward, the rider, at the first motion of rearing, should grasp the mane, pass the right leg rapidly over the back and stand on the left stirrup; if the horse does not fall back, but comes down again, the rider immediately reseats himself in the saddle and, after administering a few blows with the whip and legs, puts the horse to full speed; he then passes gradually to the walk and halt and, if the ground permits, halts on a hill with the front legs of the horse lower than the hind ones.

(*e*) WILLFUL BACKING.

§ 90. This is usually due to a weak spine and supersensitive mouth. It may be cured by riding at the fast gaits in a straight direction, as this is the easiest way to compel the horse to take the reins correctly and cease his self-willed backing.

(*f*) REFUSING TO BACK.

§ 91. This is caused by insufficient flexibility of the joints of the hind legs. It may be remedied by putting the horse through all the motions which aid in improving the flexibility—the trot, turns on a fixed and movable pivot, changes of gait, and the halts. These movements should be executed carefully, the greater care being shown the greater the defect in the horse.

(*g*) HIGH-HEADED AND HEAD-SHAKING HORSES.

§ 92. These defects are generally due to a short neck and carrying the head incorrectly; also to an improper use of the reins.

The first can not be remedied, but carrying the head incorrectly may be, by a martingale (fig. 36), or by auxiliary reins to make the horse hold its head and take the reins correctly. The reins should be used intelligently and carefully. The martingale should be fitted loosely, but so it will give a jerk

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every time the horse begins to raise the head or swing it more than necessary.

(*h*) BEARING ON ONE REIN.

§ 93. A horse bearing upon one rein, *e. g.*, the right, usually turns the head more or less to the left and the neck to the right, and the converse; in both cases the horse bears upon one rein and seeks to avoid the other.

This is usually due to the supersensitiveness of one of the gums. The horse tries to shift the weight of the bit from this gum and bears more strongly upon the other, which naturally turns or twists the neck.

Fig. 86.

The best remedy is to ride with auxiliary reins so adjusted that the one will act which is attached to the bit on the side where the horse tries to avoid the rein proper. After the horse takes the rein on that side it will bear correctly on the bit, which is all that is required.

(*i*) THROWING THE TONGUE OVER THE BIT.

§ 94. Great care is needed in curing this defect as it is very easy to injure the ligaments of the tongue with the bit and cause sores in the lower cavity of the mouth. The tongue is thrown over the bit from pain caused by it, but at first to avoid the effect of the reins. Becoming more and more

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uncomfortable from the increasing pain, the horse may finally be made very refractory.

The cause of this defect is generally bad bridling, *e. g.*, a too low position of the bit, or because it is too narrow for a thick, or too broad for a thin tongue. The first thing to be done is to fit the bridle correctly and choose a bit corresponding to the thickness of the tongue.

Tying the tongue with a cord or string should not be permitted. Without speaking of the possible disabling of the tongue, the tying is harmful because it causes the tongue to swell and become inflamed, and also hardens the mouth and makes it entirely insensible.

(*j*) BALKING.

§ 95. In breaking horses of this vice they should not be struck with the legs or whip; it is best to sit on them quietly and prevent them from leaving place for an hour, or even two hours, and then only allow them to move forward when they wish to move. Curing such horses takes much time and patience.

A horse refusing to leave the stable or corral may be broken by not being fed in the stable, but always outside and at various places at some distance from it. At first the horse will have to be led to the oats and afterwards ridden, first without and then with a saddle.

(*k*) REFUSING TO LEAVE OTHER HORSES.

§ 96. This is usually caused by a failure to understand the action of the reins and legs. To break the horse of it, the real cause must be ascertained and removed. But if the horse understands the action of the reins and legs and passages or jumps toward other horses, the whip should be used on the shoulder or neck on the side toward which the movement is made. This should be done carefully to avoid striking the eye or otherwise injuring the horse.

(*l*) REFUSING TO LEAVE THE RANKS.

§ 97. This usually results from ignorant and incorrect preliminary training, and also from placing a young horse in the ranks too soon and before it understands the action of the reins and legs. Such a horse should at first be ridden out of ranks and an effort made to pass from a halt to the gallop by

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he action of the legs; when this has been accomplished, the der should place himself between two others and at the com- and "forward march" move straight forward, the others pening out.

After a few such exercises the rider should try to leave the anks alone. Should the horse resist, the riders alongside mmediately move out and the intractable horse should be orced forward by the action of the legs and a blow of the hip.

This is repeated until the horse's habit is broken.

(*m*) FALLING TO THE GROUND.

§ 98. In this case the horse should not be struck or jerked, ut its legs should be tied and it should be kept in that posi- on for six or eight hours without food or water. Oats and ater should be near at hand and in sight, but so placed that he horse can not reach them. If six or eight hours are too ttle and the horse continues to fall to the ground, the num- er of hours may be increased even to twenty-four. If the orse is saddled, the saddle and bridle should be taken off nd a blanket placed under the head.

(*n*) RUNAWAY HORSES.

§ 99. A horse runs away on account of a paroxysm of anger, ear, fieriness, and sometimes simply to escape pain caused y the extreme and cruel requirements of the rider. What- ver the cause, the horse bears heavier and heavier upon the eins and in consequence there is produced a numbness of the outh and finally a loss of all feeling to the reins and at the ame time a loss of almost all sense. Therefore, when his orse runs away, the rider should be careful to prevent this ontinual bearing on the reins, and, besides being bold, he will eed to be able to use the reins and legs skillfully and in ccordance with circumstances.

In running away to avoid the action of the reins, the horse ther stretches the neck forward, raising the head, or bends strongly downward. In the latter case it frequently tries o get rid of the rider by kicking from time to time.

As soon as the horse begins to run the rider should take a rm seat, bend the body back, and with strong and sharp ovements of the hand toward himself, and even by jerks, y to stop the horse. The movement of the hand or the jerks

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should be from above downward if the horse's head is raised, and from below upward if the head is lowered. To give a downward jerk move the bridle hand forward and up and then bring it down sharply to the mane or pommel, thus striking a blow with the bit in the toothless part of the lower jaw. An upward jerk is made in the opposite direction and the blow strikes the upper jaw.

If the horse stops it should be immediately quieted to restore the sensibility of the mouth and then made to back a little.

But if the horse does not stop, the rider, keeping a firm seat and leaning back, should tighten and then suddenly yield the reins, at the same time trying to make the horse describe a circle. In doing this he should use the reins, but should chiefly depend on a bending of the body to the inner side. Above all he should avoid hanging on by the reins, *i. e.*, holding them with a steady and uninterrupted pressure, as by doing so he not only fails to bring the horse to its senses and to preserve the sensibility of its mouth but finally destroys both.

The rider should remember that his safety depends as much upon his presence of mind as upon his readiness of wit and skill in moderating the furious bursts of his horse.

When a horse runs away on account of paroxysms of anger, it is incorrigible or, it is better to say, incurable. In extreme cases, when other methods for curing this vice have proved ineffective, such horses may sometimes be ridden by using a more severe (thinner) bit, but one which will not wound the mouth.

§ 100. Riding at full speed upon horses in the habit of running away should not be attempted until they have been taught to pass with ease from the canter to the trot, walk, and halt.

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THE MILITIA

OF

THE UNITED STATES OF AMERICA.

By GEORGE TRICOCHE.

Translated from the French

By Capt. L. W. V. KENNON, Sixth U. S. Infantry.

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THE MILITIA OF THE UNITED STATES OF AMERICA.*

Although the problem of preparation for war is less grave the United States than in the Old World, it is yet one which seriously occupied the attention of the American people. The situation of the United States, from a military point of w, is quite unique. Differing from the great powers of rope, it has no national army raised by conscription; ther has it, like Switzerland, any period of obligatory itary instruction for all of its citizens. At the same time Regular Army consists of but the merest handful of men, l is absolutely insufficient by itself to meet any exterior my whatsoever.

The idea of an increase of the regular forces has never been eived with favor by the nation, and, furthermore, the very stence of any permanent force at all has often been nounced by politicians, economists, and by the public at ge. It seems that the dread of such disorders as prevail the little republics of South America, continually haunts minds of many Americans, filled more with respect for the nstitution than with knowledge of strategical questions. e position of their military leaders would not be the st enviable in case of a serious war. It is a well-known t that democratic principles are not easily reconciled with itary institutions. The union of these two antipathetic as is made possible in France by its situation with respect the Triple Alliance. England, the most republican of narchies, believes it has solved the problem with its regu- army, recruited by voluntary enlistment, in which the diers are well paid, and above all well fed, backed up by its l-clad amateur volunteers. Switzerland, whose national

*It must not be inferred that the opinions given and statements made ein are sanctioned by the United States War Department; they are lished without correction or amendment and are solely the ideas ertained by the author, which are here presented as a foreign view of American subject.

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organization closely resembles that of the United States, appears to be the democracy which has found the best solution of the problem; but the homogeneity of its population, the character of the country, and the slight extent of its territory are so many special conditions which make possible in that country what would be impracticable in the United States.

The Americans can not, therefore, in this matter pattern after the institutions of the Old World, and are obliged to seek a system of their own, appropriate to their own peculiar needs. In my humble opinion, which happily is supported by respectable authorities, they have not yet found it; however, the efforts they have made and the results they have obtained are such as to arouse our attention and excite our interest.

HISTORICAL.

From the year 1630, there existed in certain provinces of New England, a sort of militia composed of all the able-bodied men of the colony, between the ages of sixteen and sixty. Documents of that period mention a few cases of exemption in favor of magistrates, deans and professors of Harvard College, surgeons, masters of ships of more than 20 tons burden, etc.

In Massachusetts, the officers of each company, elected annually by the freemen of the locality, comprised a captain, a lieutenant, an ensign, four noncommissioned officers, and a company clerk.* One-half the men were armed with pikes, the remainder with muskets.

It was not, however, until 1775 that the first general regulations affecting the militia were formulated; and even then it was a simple "resolution" of the Continental Congress, recommending the enrollment, in case of need, of the male citizens between the ages of sixteen and fifty. The first House of Representatives of the new-born American Republic gave serious attention to the militia problem almost as soon as it assembled. A commission was appointed in 1789 to study the question; but, from either the difficulties of the task or the rarity of their meetings, it was not until 1792 that a militia law was passed, which remains in force to this day. On the whole, it only gave the sanction of law to what had already

* *Colonel Anderson, lieutenant colonel Ninth United States Infantry.*

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custom, with a modification in the maximum and mini-
ages of service. Every male citizen between the ages of
een and forty-five years was subject to military duty,
obliged to arm and equip himself at his own expense.*
on became evident that in time of war such an organiza-
would give to the nation bands of armed men, but no sol-
in the proper sense of the term. It was recognized that
in time of peace it was necessary to have a part of the
ia drilled, and given some notions of actual field service.
ere was but one means to accomplish this—to encourage
formation of organized bodies of volunteers, by making
ppropriation for their equipment and pay during the peri-
spent in the camps of instruction. This was the object
e law of 1808, due to the efforts and tenacity of Jefferson.
ideal of the military leaders of the period was to have in
State two classes of militia—the first being the *active*
ia, composed of men chosen on the basis established by
and the second entirely untrained, serving as a reserve
e select militia. The difficulty, which is not even yet
come, was to determine precisely the basis of selection.
fact, thanks to the taste of youth for military exercises,
active militia, throughout the whole country has been
ed by the voluntary enlistment of its members. Every-
e, or nearly everywhere, there exists a *National Guard*,
weekly drills and periods of annual field instruction.
account of the absence of Federal legislation on the sub-
the different bodies of the National Guard naturally pre-
an infinite variety in respect to numbers, equipment, and
iency.

1892, the trained militia numbered 106,269 men, and the
rained militia was estimated at 7,695,242.†

FFERENCES BETWEEN THE MILITIA OF DIFFERENT STATES.

the first place, the National Guard varies considerably
o strength in the several States. While New York has
ly 13,000 organized militia, the State of Ohio has only

*o citizens must also be added foreigners intending to become natural-
itizens. This point is of great importance in the United States.*

hese figures are subject to astonishing variations. In 1880, Col. H.
oies, in *Harper's Monthly*, gave the following: Organized militia
94 (of which number 8,973 were officers), forming 136 regiments, 54
drons, and 50 batteries, comprising 36 brigades and 17 divisions.

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8,000; the number of untrained militia in the two States being the same. Massachusetts and Virginia have the same number of unorganized militia, 220,000; the first has an active militia of 4,028 men, the second only 2,635. In Montana there is altogether only 600 trained militia, and Mississippi has long had but a skeleton organization.

Under the head of armament and equipment the differences are not less considerable. For example, the State of New York seems to be the only one which possesses a proper artillery force; and, even there, of the five batteries, one only, the Second Battery, composed largely of Germans, has the new 3.2-inch gun (corresponding nearly with the French 80-millimeter fieldpiece), excellent harness, and the new battery wagon; another, the Third, is a horse battery provided with Gatling guns. After New York must be placed Alabama, with its well-mounted and tolerably well-armed batteries.

The artillery of Pennsylvania is in very bad condition; the drivers have no leg guards, whips, or spurs; the harness is unserviceable, the pieces and caissons likewise. The light battery of Wisconsin has no regular teams; new draft horses are procured for each period of instruction; and the drawbacks of such a system are easy to guess.

The calibers of the fieldpieces are of all classes and of all epochs—Napoleon guns, Rodmans, Parrots, old bronze cannon, howitzers, Gatling guns, rifled steel fieldpieces, etc. If all the batteries of the militia were paraded together, they would present the appearance of a museum of light artillery.* It is readily seen what difficulties the question of ammunition supply would present in time of war.

Uniforms belong generally to the men, who pay for them with their own money. Some States, however, furnish uniform coats and some special articles for field maneuvers and extra duty. The equipment is the property of the State; the most generally adopted rifle is the Springfield.†

There is no single type of uniform for the militia of the United States. Some of the Northern States have adopted models which closely resemble those of the Regular Army, and

*There is not always uniformity among the pieces of the same battery. For example, here in Savannah, where these lines are written, the Chatham Artillery, the most brilliant battery of the South, possesses two 6-pounders—a gift of General Washington—a howitzer, a Gatling, and a light 6-pounder.

†In the South rifles of different calibers are found in the same company.

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organizations are obliged to wear these, but old regiments quadrons preserve their traditional uniforms. Thus the ous Seventh New York, the "regiment of millionaires," lad in gray, although this is, in a way, a forbidden color he North.* Its uniform, with facings of black and gold white shoulder knots, is pretty, though perhaps slightly quated; coats with tails are more pleasing to look at on stage than on a field of maneuver.

he First City Troop of Philadelphia reminds one at once he carbineers of the Imperial Guard and the Papal Guard Rome; its appearance is magnificent. The same may be of the gorgeous Hussars of Chicago, and of the Cleveland op.

xcept in the State of Vermont, where the uniform of ain troops resembles that of the English army; in Rhode nd and Massachusetts, where the shako is worn sometimes ead of the helmet; and finally, in the Seventh New York, the ntry of the militia in the North differs little, as regards orm, from the regular troops. But in the South! In the th, what strange things are seen! Here the companies of giment, instead of being designated by numbers or by the rs of the alphabet, bear the names of their captains or e fanciful title; they have their traditions, their special oms, and whatever uniform pleases them. The result is otley mixture that is often amusing. Bearskin caps and s with long skirts seem to be in favor in North Carolina, souri, and Louisiana; in Florida may be seen uniforms ch recall those of the French troops in the time of Charles or of Louis Philippe. The shako and a kind of frock coat affected by the infantry of Kentucky.†

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ray was adopted, as is well known, by the Confederate troops in the of the rebellion, as opposed to the blue of the Northern army.

was our good fortune, while stopping over at Charleston, S. C., in h, 1894, to witness a parade of the local militia, in honor of an ex-ederate general. With the exception of the South Carolina Military ol, which was irreproachable in every respect, the troops presented stonishing sight. An unchecked imagination seemed to have pre-over the accouterment of the militia. From Swiss guards to comic zouaves, everything laughable and improbable in the way of uniform one could dream of, appeared to have been gathered together in the streets of Charleston. The men of one company, among others, tight trousers strapped at the bottom, with long leggings, and the e crowned with enormous white bearskin caps which, seen from irresistibly suggested the idea of those useful implements made for leaning of lamp chimneys.

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The differences pointed out between the militia of the different States, as regards equipment, uniform, and strength, would have been but of secondary importance if the military value of the National Guard of the several States was everywhere what it is in those of the North and East; but such is not the case. Outside of the nine States of New York, New Jersey, Massachusetts, Connecticut, Pennsylvania, Vermont, Michigan, New Hampshire, and Rhode Island, military critics, and notably Colonel Boies, do not express a very high degree of admiration for the National Guard of their country.

It must be said that in the States above mentioned are found many bodies of troops that the great military nations of Europe might well envy; such are the Ancient and Honorable Company of Artillery of Massachusetts, the first in date of existing military organizations, going back to the seventeenth century; the First Troop of Philadelphia, of which we have already spoken, which is composed of the best class of the young men of the place, and which possesses the first national standard of the United States.* Finally the Seventh New York, which owes to the *esprit de corps* of its members, as well as to the happy choice of its successive commanders, Colonels Duryea, Lefferts, Clark, and D. Appleton,† one of the first places in the military world.‡

In the Southern States, where horsemanship is a social necessity, the cavalry is numerous and well mounted. Thus in South Carolina there are about 1,570 cavalry out of a total organized militia of 5,286; in Georgia the Georgia Hussars are made up of very good riders, and their officers are sportsmen in every sense of the word.

In the effective militia of the North we must place the squadrons already mentioned because of their uniforms, and notably the First Troop of Philadelphia, almost all of whose members possess three or four valuable horses.§

It is inexplicable that in a State like that of New York, which has about 13,000 militia, there exists altogether only 105 cavalrymen. Lovers of horsemanship, however, are by no means lacking in the metropolis. In our humble opinion,

* During the war for independence this squadron was Washington's guard of honor.

† The well-known publisher of New York.

‡ The Twenty-second New York also merits a special mention.

§ The honor of belonging to this *corps d'élite*, it is said, costs very nearly $1,000 a year.

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prestige of the Seventh Regiment attracts to the infantry elements which should naturally furnish the State with squadron which it lacks.

n the instruction, both of siege and field artillery, there is onsiderable defect—the lack of drill in actual firing. The general inspection reports of the National Guard state t the only maneuvers in which the artillery is exercised those of the drill ground and firing with blank cartridges. the very rare occasions where the firings have been exe-ed, the results, so say the military authorities, can not be sidered as of any importance whatever. It can not be d, either, that firing grounds are lacking in the United tes.

he militia are not intended merely to oppose a foreign my; one of their principal functions is to quell riots within limits of their respective States. The organization of artillery is therefore modified by this double necessity. the side of the ordinary siege and field batteries have been nd sections armed with machine guns, etc.; they are for most part attached to infantry regiments and are served men of that arm. Thus the Seventh New York has a gun achment which is drilled every Saturday evening; in New sey every regiment has a section of eighteen men com-nded by a first lieutenant, and provided with howitzers of caliber used in the Navy, (3-inch).

he settlements of the Northwest have a quite numerous itia. Although often without regular equipment or uni-n, they are kept efficient by the near presence of the ians. The military spirit is so well developed in these re-ns that they have in a way overshot the mark; that is, that the formation of military organizations they have not ays been guided by local needs, which should be the case egions which, like North Dakota, are, so to speak, in a e of perpetual siege, and where, for example, are found vy batteries in a district wherein troops are used only inst Sioux Indians or horse thieves.

GENERAL ORGANIZATION.

n each State, the governor is *ex officio* commander in chief he National Guard of his State. Under his orders he has mplete staff—too complete in fact, for he is permitted to ch to his person an indefinite number of aids, whom he

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chooses from his friends and acquaintances. These officers, taken from civil life and at once made majors and colonels, have, most frequently, no other title to their promotion than the zeal they displayed during the electoral campaign of the governor.* This is an abuse which military authors have long pointed out, and which comic papers have ridiculed day after day, but without success.

Leaving aside these trifling abuses, which are inseparable from universal suffrage, we find, in the Northern States at least, intelligently organized headquarters.

The staff adopted by New York, New Jersey, and Pennsylvania is about as follows: The governor, commander in chief, with the rank of major general; an adjutant general, chief of staff, with the rank of brigadier general; an inspector of rifle practice (small arms), with the rank of brigadier general; a surgeon general; a provost marshal general; an inspector general; a quartermaster general; a chief of ordnance; a paymaster general. Below these are found the division and brigade staffs, as the case may be, and which comprise, besides the general and his aids, an inspector, a surgeon, a quartermaster, a paymaster, a provost marshal, a chief signal officer, sometimes an engineer officer, etc.

There are States in which the militia is entitled to great credit for organizing and drilling; for the State itself not only fails to appropriate money for their benefit, but apparently endeavors to discourage the National Guard by every possible means.

In Arkansas, notably, if our memory is correct, the office of adjutant general, in point of fact the real chief of the militia, has been abolished, and his important functions devolve upon a mere private secretary of the governor. One may see, if not an excuse, at least an explanation of such antimilitary measures, in the fact that the legislature of Arkansas is afraid of being gradually drawn into expenses which might become burdensome to a new State.

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*When the governor is changed, his staff may remain as it is, but the new governor does not fail to make new promotions, so that after a few years the number of these useless officers reaches a considerable figure. Not long since both branches of the legislature of Missouri were composed entirely of colonels. On this occasion the *Saint Joseph Gazette* remarked that it was time to stop this invasion of staff officers, and proposed to establish a sumptuary tax upon officers without command, according to their rank—$100 a year, for example, for a colonel.

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Indeed, it costs some States dear to maintain their militia. Uncle Sam is not particularly generous in the matter, and the appropriation of $400,000, which he allots annually to the National Guard, is ridiculously small. The allotment of this fund, for example, gives California $7,500, while at least double that amount is needed. The different States of the Union, when they make a point of having a suitable or even presentable militia, must impose heavy sacrifices upon themselves, without speaking of the sums contributed individually by members of the Guard.

New York alone, if our figures are correct, spends as much upon her militia as the Federal Government does for the entire country.

The average amount of the cost of maintenance paid by the States is about $33 per man annually.*

The position taken respecting the National Guard by the legislatures of certain States, is at least singular, and shows how much enthusiasm is necessary to impel a young man to enrol himself in the militia. In Vermont, $13 is allowed each man for his uniform, which costs at least $23; and although the soldier is thus obliged to expend $10 for his uniform, it remains, under the law, the property of the State. In Missouri no appropriation was made for the militia in 1886, and the expenses were covered partly by subscriptions of the Guard, and partly by the sale of tickets to people who wished to visit the camp and witness the drills.

The organization of the several units of a State into brigades and divisions is made only when the importance of the militia renders this necessary. But the grouping of companies into regiments is the rule, even in the South, where, as we have seen, the spirit of independence in military organizations is considerable. It must be said, by the way, that neither this spirit nor the differences which exist at times between different companies of the same body as regards recruitment, uniform, and names, have any influence whatever on the intrinsic military value of the regiment. The First Volunteer Regiment of Georgia, for example, has the reputation of being one of the best regiments in the militia, although composed of very diverse elements; one company (the Jasper Greens) is composed entirely of Irishmen; another (the German

*Illinois is the most favored, with $19. California spends as high as $53 per man.

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Volunteers) exclusively of Germans, and several other companies, each having its own peculiar characteristics.

However important may be the assembling of small units under the command of a common chief, it is scarcely practicable except in cities of some size. In smaller towns the formation of separate companies is, perforce, tolerated, if not encouraged. Their instruction, for many reasons easy to guess, often leaves much to be desired, but their spirit is good, precisely because they have to struggle to live. Military authority looks upon them with little favor, and when they are below the average requires them to disband. This has happened quite recently. The Thirty-second Separate Company of New York and the Fortieth Separate Company of Syracuse, numerically strong but without military value, were disbanded by Governor Flower on May 18, 1892.

It is worthy of remark that, in the State of Vermont, the First Regiment of Infantry is excellent, although each of the six companies belongs to a separate locality; but it is a known fact that the "Green Mountain Boys" are soldiers from the very cradle.

In the South, on the other hand, thanks to the tendencies we have mentioned, the spirit of independence, etc., separate companies have much vitality and often brilliant qualities. The Chickasaw Guards of Memphis, Tenn., can not be passed in silence. This company has, for some years past, won all the first prizes at the drill contests of Memphis, Nashville, New York, and St. Louis; and General Sherman, in 1878, gave it the palm not only over the Regular Army, but even over the West Point Military Academy.

We like to think that these soldiers would prove not less remarkable on the field of battle than in the rose-bedecked track of a racing course.

Merited homage must also be rendered to the little company of 40 men, the Gate City Guards of Atlanta. Full of ardor, they are always ready to take train or boat for any place or purpose. A mere accident prevented their participation in the Paris Exposition of 1889.

In the State of New York, at least, the grouping of companies is considered of such importance that the new military code of 1893 requires the formation into battalions of the companies of a regiment. This is a novelty in the military history of the United States. Regiments of more than twelve

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panies are now divided into three battalions; those of a number into two only. As the companies have an actual ngth of not more than 40 or 50 men, it does not seem to hat there is any special object in copying European insti- ons in this respect, since it gives to the infantry as a unit ombat a battalion of the strength only of a French or Ger- company on a war footing.

he militia is recruited by voluntary enlistments, the term ervice varying from a few months in some States to five rs in others. The candidate must be admitted by the nbers of the company in which he proposes to enter; he ected by them. Election plays a great role in the National rd institutions. Each company has the privilege of osing its own officers and noncommissioned officers; in e States officers must, as a preliminary qualification, in a certificate of proficiency from a board of examiners. s regards the noncommissioned officers, the fact of hav- received the majority of the votes of their company is always sufficient to confer grades upon them; certain ulations require that they be accepted after examination he chief of the organization to which they belong.

he major generals alone are, as a rule, chosen by the gov- or of the State.

CAMPS OF INSTRUCTION.

lmost all the States have recognized the necessity of iring their troops to pass a certain period in the field, in ition to the weekly evening drills and parades in their ories. They have organized what they term "Periods of nual Encampment," and every body of troops has to pass rtain number of days (from three to seven) in the summer utumn, under canvas.

he most celebrated of these camps are Peekskill, on the lson, for New York; Mount Gretna for Pennsylvania, Sea Girt for New Jersey.* But the palm belongs to the

*The camp of Sea Girt is admirably located. It covers about 90 acres s flanked by a beach, where the men have every facility for sea bath- The grounds are rented by the State of New Jersey, with option of hase at a fixed price.

e camp of Niantic, in Connecticut, is likewise by the seaside. It con- some 59 acres and is owned by the State. The Massachusetts camp uth Framingham, near Boston, may also be cited. It is remarkably kept, entirely inclosed, with gates guarded by sentinels, and is easy cess. It contains about 90 acres and is owned by the State.

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first. There, from May until September, each regiment, battery, and separate company must pass one week, at such date as may be fixed by the adjutant general. The ground chosen is admirable in every point of view; the plant is perfect, with electric lights, storehouses, a special corps of musicians maintained by the State; also games of all kinds and clubs provided with daily papers and reviews.*

Encampments have become very popular in the last few years, even in the South, where, for some time after the war of 1861–1865, efforts were made to keep secret everything relating to the militia, and where the opinions of the Federal military authorities were disdained.

In certain States, the strange fact is noted that private enterprise has forced the hand of the local government, which was too slow in coming to a decision. In Wisconsin, in 1887, a few capitalists who were interested in the National Guard bought about 400 acres near Madison and donated the land provisionally for a camp of instruction. The legislature was obliged finally to purchase the land. In California, there was for a long time no regular camp for the militia; the legislature, which convened only once every two years, voted a miserable appropriation, which was deemed sufficient for the two periods of instruction; the money was remitted to the commanding officers, who went into camp where they pleased. But, in 1885, the division encamped at Santa Cruz spent in a single season the appropriation for the two years, and the California legislators were compelled again to loosen the purse strings.

Furthermore, in other States, drill grounds have been gratuitously furnished to the National Guard. In Pennsylvania, the Mount Gretna camp was donated by Mr. Robert Coleman. In North Carolina, the Wilmington camp of about 90 acres was presented by a society of merchants and the Wilmington and Ocean Beach Railway Company.

The annual encampment entails considerable expense, which falls, more or less, upon the troops themselves. In New York,

* We will not here enter into minute detail concerning the organization of these camps of instruction any more than we have done in discussing elections or shall do in the subject of armories. That would burden the subject too much and remove it from the purely tactical limits we have assigned to this sketch. Besides, we propose to describe the life of the American militiaman in a special work intended as a continuation of "The Congé or Queen's Royal South Surrey Regiment."

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sportation, subsistence, and camp equipment are furnished
he State. In Massachusetts, no rations are furnished;
nted troops march to the camp, and for the march receive
day's pay; the several companies are obliged to furnish
own bedding. In North Carolina, the State provides
ything except subsistence. In Connecticut, the State pays
everything, including subsistence, and the rations may
ommuted at the rate of 30 cents a day. In California,
commanding officer receives about $1.25 per man, and
this sum the regiment is supposed to meet all expenses
ansportation, subsistence, and camp equipment.
this matter, as is seen, the laws differ greatly.
few camps do the men give attention to the details of
ing; most frequently the companies hire cooks and wait-
or the duration of the encampment, besides the regular
loyees of the armories, who follow the troops upon the
of maneuver. In Alabama, the troopers even have their
es groomed and saddled by negro servants.
e expense of the encampments is greatly augmented by
necessity of paying the militia during the period of serv-
Without doubt the pay can not be considered as very
rtant for the soldier, for it is altogether out of proportion
e assessments and expenses of all sorts to which he is
ect throughout the year. But it is a rule, which may be
l general in the United States, to indemnify, as far as
ble, the members of the Guard for disturbing their pri-
business affairs, their instruction being regarded as a
ure of public security. In Pennsylvania, the private sol-
receives $1.50 per day; the sergeant, $2; the colonel, $12.
Massachusetts, the men receive $2 if they belong to the
ntry and $4 if in the cavalry. In another State the pay is
ame for all, of whatever grade they may be.
re, also, there are rules to suit every taste.

THE NATIONAL GUARD IN QUARTERS.

dinarily the militia is obliged to have only a certain
ber of drills annually. These are held in places called
ories, where there is not only a drill room, but offices for the
mental staff, storerooms, meeting rooms, etc. Naturally
e establishments present very varied aspects. Between

Pennsylvania the cost of the annual encampment is estimated at
00, or about $22 per man.

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the armory of a colored company in a Southern village and that of an opulent regiment of the North there is as much difference as between a hut and a palace. Generally the armory possesses, besides the general drill room, halls of more modest dimensions for the school of the soldier or the instruction of recruits of the different companies. In many, besides these schoolrooms, there are company rooms, where the men of each company change their clothing and meet before and after the drill, give parties, etc. The great entertainments are given in the reception or drill halls, which are easily convertible into ball rooms.

The model of the kind is the armory of the Seventh New York, a marvel of architecture, furnishing, and ornamentation, which cost more than $600,000, without counting what has been disbursed by different companies for their own special rooms. That of the Seventy-first New York cost about $400,000; that of the Twenty-second New York, about $300,000. The price of the land is not included in these valuations.

Sometimes, to diminish expense, several organizations use the same building. This is the case notably in Oregon and in Illinois, where the infantry and artillery are together, as well as New York, where the armory of the Seventy-first, besides the regiment itself, contains the brigade headquarters, the Signal Corps, and the Second Mounted Battery.

The cost of armories is covered partly by subscription and donations, partly by money raised on mortgage, or by appropriations voted by the local legislature.

These edifices, in which are kept the arms and equipments of the various organizations, are constructed in general on the model of ancient castles, so as to be capable of defense and secure from sudden assault in case of riot.

At first glance it would seem that less luxurious quarters would as well answer every purpose, and that a small part of the sums spent in decoration would be more usefully employed in purchasing cartridges for practice in rifle firing, or camp equipment. But the fact must be borne in mind that the recruiting of the National Guard requires that the militiaman be guaranteed a certain amount of pleasure and a certain degree of comfort, in harmony with his social position.

Besides, an organization which could not suitably receive the daughters, wives, sisters, and especially the sweethearts

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of the gallant militiamen, would be without honor in the eyes of the people.

GENERAL GLANCE AT THE INSTRUCTION OF THE MILITIA.

In a general way militia instruction presents two phases—instruction in quarters and in camp.

The manual of arms, close-order movements as far as and including the school of the regiment, and firing at short distances are taught in the armories throughout the year, drills being more or less frequent according to the facilities of communication or custom. For mounted artillery and cavalry, mounted drills are necessarily very limited, owing to lack of suitable ground and the expense of maintaining mounts.

From time to time some ceremony comes along to break the monotony of these drills, which are practically all alike; some review, perhaps accompanied by brigade movements, preceded by the inevitable parade of the Guard and followed by gymnastics, or by a game of baseball—the national pastime—or by other out-of-door sports. As regards physical exercises, these militiamen could give points to the most agile of the French *chasseurs à pied.*

On these great occasions, as likewise in the solemnities distinguishing the awarding of prizes for marksmanship, the local celebrities and the families of the guardsmen are invited guests. Neither do they forget the representatives of the press, who profit by the occasion to inform the world that the "Gallant Blues," or the "Light Artillery of Blankville" are up to the standard and are ready to take the field against any enemy whatsoever.

Target firing is the object of constant attention on the part of the military authorities. On this point the militia leave far behind them the reserve troops—to go no farther—of the great military powers of Europe. The National Guard is not only obliged to fire a fixed number of shots in the field, at the camps, or at other special ranges like that of Creedmoor in New York; but the armories are, in general, provided with galleries for firing at short range; and shooting matches between companies of the same regiment, or between regiments of a brigade, keep the marksmen in constant practice. At the army of the Seventh New York, the gallery, which is situated under the main drill hall, is crowded nearly every

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night, and as many as 20,000 cartridges have been fired in a single evening.

Field exercises and brigade evolutions take place in the camps of instruction.

The methods of instruction employed in different camps are very varied. At the present time a tendency is manifest toward the formation of brigades, for the period of instruction. In Pennsylvania, good results seem to have been obtained by the following system: First year, fifteen regimental camps, each established in the immediate neighborhood of the home of its members, to reduce cost of transportation; second year, three camps, one for each brigade; third year, division camp at Mount Gretna.

In New York, the period of instruction is one week for each command, which reports in its turn at Peekskill during the summer season.

In New Jersey, the camp is by brigade, but the turn of each brigade comes only every other year.

In the camps of Connecticut, Massachusetts, North Carolina, and Mississippi are seacoast batteries, built by Regular Army officers, but firing is rarely practiced on account of the cost, and, as we have seen, the special need of the National Guard is money. At the camp at Sea Girt, such firing could be practiced under excellent conditions, but nothing more has been attempted than a few movements with a Gatling battery.

It is astonishing that the field instruction should still be made to include certain antique ceremonies, which cause the men to lose too much time without sufficiently compensating advantages. The mania for parades is found even in camps meant for serious instruction. Almost everywhere, one day is devoted to a review by the governor—a useless performance, for, generally, the governor is entirely unable to appreciate the quality of his regiments. Besides, some governors, as in New Jersey, camp with the troops and see them every day. In any case, these functionaries have the different commands reviewed often enough in their armories to excuse them from a parade in the field of maneuver.

In New Jersey, three days are thus lost in reviews—one for the governor, another for the brigade commander, and the last for the division commander. In Maine, where the camp lasts but a few days, it is the traditional practice for the command to repair by railway to the neighboring town, and in

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this way to utterly waste an entire twenty-four hours. In Connecticut, the transportation of troops and the reviews sometimes occupy the greater part of the time spent under canvas.

All this is as displeasing to the taxpayers as to employers, who often make considerable sacrifices in allowing their employees to go into camp.*

In the United States, an extreme degree of importance is attached to the daily parade of the Guard, a ceremony which in France has long since lost any impressive or useful effect. Here they have gone to the other extreme. Guard mount is an affair of the utmost complexity, which enjoys the incontestable property of puzzling the uninitiated and naturally of delighting the people. Only this ceremony requires much practice, and consequently it is repeated so often that it seems to us to absorb too great a part of the time spent in camp. The supposed necessity of excessive drill in this respect results often in a very strong guard. In Michigan, for example, a guard consists of 2 officers, 7 sergeants, 21 corporals, and 179 privates. Such a guard naturally diminishes the strength of companies for drill.

In one State the entire guard is relieved every two hours in order apparently that everybody may witness this interesting ceremony; certainly, the system seems to have nothing else to recommend it, for it requires a triple supply of men for guard duty, either marching off and fatigued, or preparing to march on and equally unavailable for serious maneuvers.

The discipline of the militiamen is the principal object of the National Guard, but in our humble opinion this result could better be obtained by the constant activity of the officers, the correction of mistakes, and much firmness united with great tact. A striking example is afforded in a certain State where the elements of which the Guard is composed are excellent, but taken individually the privates are beneath consideration in respect to discipline and soldierly appearance in camp. As to this particular case, read the old general inspection reports and those of 1893, and you will always find the same statements: men in shirt sleeves, or with coats unbuttoned, pass without saluting their superior officers, who

* The little State of Connecticut devotes more than $110,000 annually to its militia; North Carolina spends about $7,000 annually on its encampment and $500 more for office expenses of its four chiefs of corps and the brigade commander.

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pretend not to see them; sentinels ignorant of their duties and solely bent on finding a comfortable place in which to seat themselves; soldiers and officers fraternizing after retreat and drinking together, reminding one of the worst days of the French *garde nationale*.

With all this, however, it would not be right to judge the American militiaman in camp too severely. It must not be forgotten that the service is purely voluntary, generally onerous, and that, considered as a whole, the National Guard is animated by a commendable zeal which is not always recognized as it should be. Some mounted organizations, for whom the parsimony of the legislature fails to provide means of instruction, go into camp as infantry and perform the duties of that arm; for example, the two squadrons and the light battery of Montana. Is not this the acme of devotion?

The militia receives a special instruction, which is peculiar to the United States, in the riot drill. In fact the suppression of riots is one of the most important functions of the National Guard. Not a year passes when, in one State or another, it is not called upon to protect the rights of laborers against strikers, disperse election mobs, enforce quarantine regulations, or guard private property after one of those terrible conflagrations of which America possesses the secret. On these occasions the militia has never hesitated a moment in doing its duty, even in the face of real dangers.

The *riot drill* embraces a series of special formations, designed rather to clear the streets by pressure than to fire upon the mob or inoffensive passers-by. A knowledge of this system would have saved much trouble to the authorities charged with reestablishing order at Tourmies. The Gatling, or other machine-gun batteries, maneuver on these occasions with the infantry.

THE MILITIA IN ACTIVE SERVICE.

The foregoing remarks lead us naturally to speak of the mobilization of the militia, and also of its service in campaign.

Of operations of war against a regular force, it is impossible to say much, because American wars have always been of long duration, and the militia who have taken part in them have, in general, had time to familiarize themselves with the discipline and fatigues of the campaign before being

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iously engaged. The war of the Revolution was prolonged m 1775 to 1783; the second war against England, from 1812 1815, and the war of the rebellion, from 1861 to 1865. can not really be said that these Homeric struggles were ight by the National Guard, although it furnished a part, if all, of the contingent engaged. Call them what you may, n who have been actively engaged in war for years are *diers* in the ordinary acceptation of the word. From these ts, however, it is impossible to draw any conclusion what- r regarding the true value of the militia as it is organized at s time, unfamiliar with marching, without serious experi- e as regards service in campaigns, and especially without perience of camp life, should it be mobilized according to ropean rules and suddenly opposed to an armed enemy nposed of regular troops.

n 1861, it is true, some commands found themselves gaged after a very short period of preparation; but the xperience of men and generals was common to both sides, l for this reason no satisfactory conclusion is possible.

There were exceptions, in truth, and some brilliant excep- ns. The Seventy-first New York, in July, 1861, at the battle Bull Run, although composed of men who had never been der fire, and which had been in active service only two nths, exhibited a gallantry and devotion of which history esents few examples. But, as usual, these exceptions con- n the rule. Bull Run was one of the first battles of the r of the rebellion; and, notwithstanding the valor of the venty-first and of the rest of the Burnside Brigade, it was loody defeat for the Union forces, precisely because of the k of training of the other troops of the militia.

Such regiments as the Seventy-first and Seventh New York, First Illinois, the First Troop of Philadelphia, etc., are ruited in a special manner, under direction of superb com- nders. Tradition and *esprit de corps* not only render any fection impossible, but make heroism a mere matter of urse. *Noblesse oblige.* How many regiments would have en able to accomplish the task which devolved, for example, the Seventh or the Seventy-first New York at the opening hostilities without previous training, no one can tell.

And furthermore, consider what the men of the Seventy-first ffered in their forced march from Annapolis to Washington, miles in a single day, over dirt roads, when, according

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to historians of the time, none of them had ever marched more than 9 consecutive miles in their lives—the faults which were committed, like that of equipping men in winter clothing in the month of May and in the latitude of southern Italy; all this, if any conclusion whatever may be drawn, would prove but one thing, which is, that any operation of war whatever is hazardous with newly raised militia.

As regards the proper method of instruction to be employed in the National Guard, the military public of the United States is divided into two camps—those who advocate, respectively, the methods of New York and of Pennsylvania.

The latter, considering the service as a serious affair, and banishing all idea of mere parade and show, believe in the principle that to be really useful in time of war the militiaman should be subjected in time of peace to a systematic and continuous training.

The New York school maintains, on the contrary, that it is only by rendering the service easy and attractive that suitable recruits can be assured; that the militiaman should be made to love his trade as a relaxation, a diversion from the bustle and stir of business—in short, as a patriotic recreation. The partisans of this last system constantly cite the Seventh New York as a living proof of the excellence of their arguments. The *Army and Navy Journal*, although favoring the New York school, recognizes—we state it with pleasure—that this is an error. "The Seventh Regiment," it says, "would have been a success under any system and in any State whatever, by reason of its system of recruiting its members and of having been administered with prudence, conservatism, and devotion on the part of its commanding officers."

It is not without interest that we remark, also, that these *corps d' élite* have always been regarded by the military authorities of different epochs as a sort of Old Guard, and have, so far as possible, been sparingly used. They were, properly speaking, military schools, or nurseries, from which were drawn excellent material for the formation of regiments to take the field. The Seventh New York, during the war of 1861–1865, furnished several hundred officers to regiments raised by the State. In the same war, from the Seventy-first Regiment was taken the nucleus of the famous One hundred and twenty-fourth Infantry, which took part in thirty-seven

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attles and lost more than 240 men, almost all of them mem-
ers of the Seventy-first Regiment.*

In 1812, the newly organized militia, opposed to soldiers of
he British regular army marching upon Washington, ren-
ered far from brilliant service; but it must be said that the
ational Guard of that time was deplorably organized. We
ill not, therefore, dwell on this point. There is, however, a
ar in which the militia was called upon to serve in conjunc-
on with regular troops, viz, the Mexican war of 1846–1848.
here they were found under nearly the conditions in which
rtain military authors would like to see them placed to-day,
front of a foreign foe.

But here also are figures to show once again the results of
ck of training. A Tennessee regiment, 900 strong, returned
ome after one year's campaign, with 350 men; the rest
d either died of disease or were sick in hospital. It
st, solely from the hardships it had to endure, as many as
men in a single month.† The Second Mississippi lost 167 men
six months in the valley of the Rio Grande, without having
ce engaged the enemy. A brigade from Pennsylvania,
800 strong, returned to the United States with only 600 men;
e remainder had literally broken down on the march; one
mpany among them, Captain Taylor's, was reduced through
ck of training from 104 to 17 men. A Georgia battalion,
hich reached Mexico with 419 men, lost 230 by disease, and
hen ordered home had but 34 soldiers left to answer the
ll call. In one of its companies, originally 100 strong, one
ldier only answered "present."

In another point of view, that of discipline, the results were
t always brilliant—the Massachusetts volunteers, for ex-
mple, had to be partially disbanded at Vera Cruz on October
, 1846, as "unworthy to bear arms," and well merited the
buke given them by Brigadier General Cushing, who pro-
unced them "a disgrace and a nuisance to the army." The
lvocates of the New York school should find matter here for
rious meditation.

Where the militia excel is in what we may term the *service
order*, that is, in the repression of riots, etc., within the
mits of their respective States. In an exceedingly short

*The Philadelphia squadron (First Troop) alone furnished 68 officers to
e other organizations of Pennsylvania and the neighboring States.
†Review of the Mexican War, by Wm. Jay. Boston, 1849.

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time the National Guard of a State may be assembled, embarked, and directed upon any given point.

When the governor realizes the necessity of calling out the militia, he issues a proclamation, on the receipt of which the commanding general of the troops, for instance, in the State of New York the division commander, whose headquarters are in the capitol at Albany, near the governor's office, telegraphs the order of mobilization to the brigade commanders, who repeat it to the regimental commanders; the latter communicate it to the captains, or lieutenants in case of the captain's absence. These officers in their turn always know where to find their factotum, the first sergeant, who is a sort of adjutant or company sergeant major and upon whom devolves the task of finding and assembling the men at the armory. The captain and his first sergeant usually have a memorandum book constantly at hand, in which they keep a record of the names and addresses of their men.

As far as possible the task of finding the men is simplified by first notifying the sergeants, if these are not too remote from each other; and the sergeants in this case are charged with assembling their squads, but this is not always practicable. On their part, the civil authorities, also notified of the mobilization, employ every means in their power, by bills, drums, and posters, to give notice of it to the public.

Care is taken, in organizing squads, to make them up of men living near each other, or employed in the same establishments. Thus in western Pennsylvania there is a regiment of which one company is almost entirely composed of miners. A signal given by a foreman is sufficient to assemble the men in a very few moments.

On such occasions every one exhibits a surprising cheerfulness and good will. In 1892, at the Homestead troubles, the militia left the seashore, or watering places, and some even interrupted their wedding journeys to join their regiments.

This state of mind of the National Guard, alone, can explain the astonishing results obtained whenever the militia is called out.

In 1892, at the time of the riot occasioned by the enforcement of quarantine regulations against cholera in the environs of New York, the order of mobilization was received by the colonel of the Thirteenth Regiment at 2 o'clock in the afternoon; six hours later he had already sent a detachment of

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) men to the menaced point. On the same occasion the xty-ninth and the Naval Battalion received their orders at out midnight; the men were assembled in their armories early dawn.

In 1877, during the strike at Buffalo, the Cohoes Company ceived its orders at 1.40 p. m. It acknowledged their receipt 1.46 and announced itself ready to march at 2.56.

On the 11th of July, 1892, the militia of Pennsylvania in huylkill County, consisting of five companies of the Eighth, d two of the Fourth regiments, and the brigade band, rned at 2 a. m., were assembled and on the way to the nt of concentration by midday.

The same night orders were received by the colonel of the irteenth Pennsylvania, at Scranton, at half past 2; one- f an hour later, although the summons was entirely unex- cted, a great number of his men had already been notified. t is readily perceived that under these conditions the con- ntration of the entire Guard of a State at any given point y be very quickly effected.

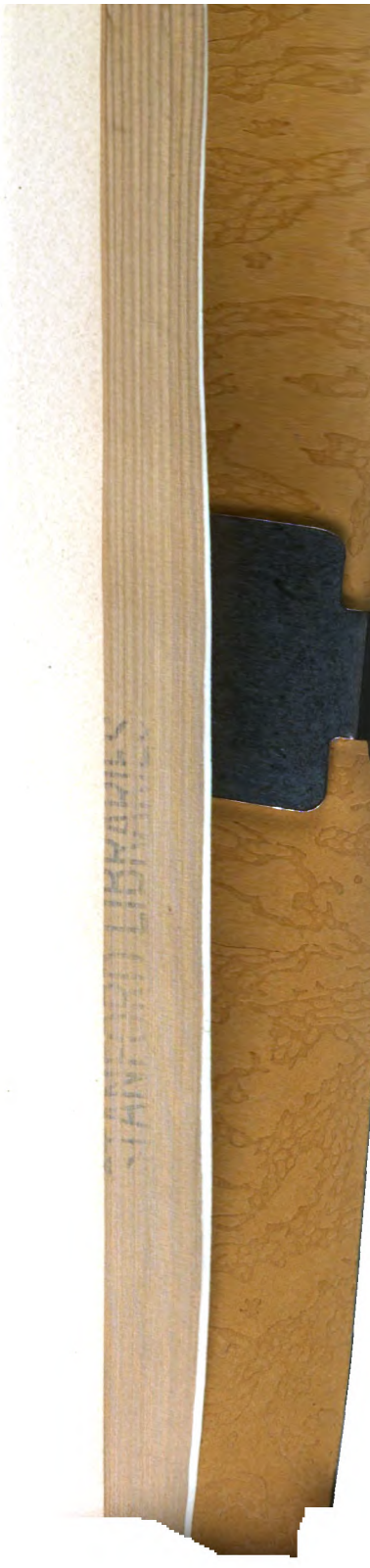
In 1893, the Illinois National Guard was assembled at the position in Chicago in twelve hours. In July, 1891, and August, 1892, the Tennessee militia were concentrated in enty-four hours at Coal Creek and at Oliver Springs to press disturbances, certain troops having to travel about miles.

During the Homestead riots, two brigades, consisting of 00 men, infantry, cavalry, artillery, trains, and ambu- ces, were put upon the field of operations within less than enty-four hours after the governor's proclamation and less n sixteen hours after the receipt of the mobilization orders the several regiments.

In 1877, 7,000 men of the New York National Guard were ncentrated at Buffalo from six to eighteen hours after the l by the governor.

In these last two cases it was necessary also to secure unts for the artillery and cavalry from livery stables and rse-car companies.

It is to be noted that, except in Massachusetts, at least so as we know, no preliminary drill is had in mobilizing ops. At the most, in certain States, marches of some gth are sometimes made, though these are in general dertaken by mounted troops only. The First Troop of



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Philadelphia, among others, makes raids from time to time. In 1886 it covered nearly 125 miles in four days without any difficulty, a sufficiently good result for untrained men and mounts.

It is the exceptional case for infantry to be marched to the encampment. At the end of July, 1893, a detachment of the Thirteenth New York, as well as the First and Second batteries, marched to Peekskill by land. The foot soldiers appeared to suffer for want of preliminary training, as on the second day's march the column arrived in camp about three hours late. The most brilliant march effected recently by militia troops, to our knowledge, was that of Company C, Second Regiment, Wisconsin National Guard, which in 1893 covered 67 miles in three days, and the last day's march of 28 miles was followed by a drill in battle maneuvers.

CONCLUSION—GENERAL GLANCE AT THE MILITIA OF THE UNITED STATES.

Washington was the first to recommend the adoption of what he called a proper peace establishment, designed to unite the militia throughout the whole extent of the country, to provide them with a regular equipment, and maintain them upon a sufficient footing. To him is due the definition of the National Guard, as true to-day as it was in 1783: The militia of this country must be considered as the palladium of our security and as our first effective reserves in time of war.

Jefferson, who did much for the National Guard, expressed himself in a similar manner: "For a people who are free, and who intend to remain free, a well-armed and well-organized militia is the first of guarantees."

It seems that it required a long time for the people of the United States to realize the profound justice of these words. It may be said that, until the terrible experiences through which the country passed in 1861–1865, the militia did not enjoy with the different State governments, nor with the public at large, the favor it had a right to expect from both, after the efforts of Washington and Jefferson. The effects of this indifference were felt from the very beginning of active operations. Mr. W. R. Hamilton says:* "More men were lost during the first part of the war through the ignorance and incapacity of commanding officers than by the bullets of the

Cosmopolitan, August, 1890.

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ny." The choice of officers, appointed in haste and at the moment, was in the highest degree detestable. In their ointment, very often less attention was paid to the military ifications of candidates than to the part played by them nlisting recruits, or to their political influence. Heads of companies, innkeepers, village journalists, barkeepers, were from one day to the next improvised into captains, ors, and colonels. Two years of continual reverses in the , says Mr. Hamilton, were required to teach the country t qualities were essential in an officer.

or a certain time after the war of the rebellion, the National rd had to pass through a critical stage of its existence. T. W. Higginson wrote, in September, 1865,* that the of 1861–1865 would mark a period of suspension in the nation of that effective military organization which had sought since the days of Washington and Jefferson. "No s of society," said he, "is disposed to take an active part . For the soldier recently returned to his fireside to find pleasure whatever in enrolling himself in the militia ld be exactly as if a wood sawyer, his daily task completed, ld bring his tools to his room and begin to saw wood for eation." As for those who had not served, they would feel se of shame in parading after the war was over before the ans of the grand army. Moreover, the younger people d have to devote all their time to the reconstruction of the nercial and industrial life of the country, and to reserve heir savings to meet the crushing obligations which sur- d the war. The appeal then made by Mr. Higginson to cise the school children in the manual of arms has been ally answered. In almost all the States, colleges have been nized on a military basis and often placed under the charge ficers of the Regular Army, detailed for the purpose. At rate the military spirit has been greatly developed in the es since the war. In 1887, Mr. Lloyd G. Bryce could e: "The changes which have taken place in the militia infinite, from the days of the umbrella and cornstalk ia to the present, when troops armed and equipped in atest mode are at the disposition of every State."† But he that the militia may not yet be considered as having

* *Atlantic Monthly.*

† *North American Review:* "A Service of Love."

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attained perfection, or even as being ready for the part that would fall to them in time of war.

In the opinion of serious military authors, and of well-informed people in general, the militia is destined to form the real army of the United States, the regular troops covering the mobilization, giving the National Guard time to assemble, and especially to be trained.

As to the armory tacticians who, delighted by the correctness of some parade of the Guard, dazzled by the splendor of its officers in gala attire, and who repeat in every key that the Guard stands ready at any time to take the field against the armies of Europe, they may be left to their illusions. They are not required to test their theories and consequently are not dangerous. On the contrary they have their use, for it would be desirable in the United States if each militiaman could be persuaded that he is able, by himself alone, to overcome a battalion of Highlanders or a company of Bersaglieri.

The criticisms to which the militia is open to-day are numerous enough, and among them some are very serious. A few may be apparent from the brief account which we have placed before the eyes of the reader. Such are, first, the lack of uniformity in arms; second, the loss of time in the camps of instruction; third, the lack of firing drill for the artillery; and fourth, above all, the insufficiency of the annual appropriation voted each year by Congress.

This appropriation was $200,000 in 1808. Since that time it has reached only $400,000, although the strength of the National Guard has increased more than tenfold during the same time. To-day, if divided among all the States, it amounts to 1 cent a day for each guardsman.

Leaving aside certain criticisms as to matters of no great weight, such as incorrectness of the reports furnished by the different regiments, and errors committed in the parades of the Guard, we will select from official documents, from articles bearing on the subject, and from the notes we have taken from divers sources, the following criticisms:

First.—The lack of firmness in officers, proceeding in part from the situation in which they are placed with respect to the men, to whose votes they owe their position.

Second.—The slight requirements demanded of officers in some States, Ohio for instance; the examinations to which they are submitted are at times merely farcical. Again

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examinations are not everywhere obligatory.* And, finally, no regular progression is required in promotions—a lieutenant may be appointed major, or a captain a colonel without the least service in the intermediate grades.†

The lack of uniformity in instruction.‡—For the evils from which the militia suffers, some propose one remedy, some another, each pretending to have found the panacea destined to transform in a single day the entire National Guard of the Union. It seems to us that the problem is of too complex a nature to admit of a simple solution. Neither the increase of the annual appropriation, nor a better choice of officers, nor uniformity of instruction, taken separately, would produce the required results. The solution is not easy to find, precisely because it implies at once the united action of the Congress at Washington, of the local legislatures, and of the officers and men themselves, in short because it necessitates a concurrence of opinion strong enough to triumph over the inertia and parsimony of legislators. In the first rank of remedies, we place, of course:

First.—An increase of the annual appropriation voted by Congress. Mr. Albert Ordway demands that the minimum amount should be $1,000,000.

Second.—The creation at the War Department in Washington of a bureau specially charged with the organization and instruction of the militia. It is wrongly objected by some that the National Guard is not under the direct orders of the President of the United States. The latter being by constitutional provision commander in chief of the Army, it would not infringe upon the sovereignty of the several States for him to occupy himself with the organization of the militia, which the Constitution of the United States authorizes him to call out when the Union is in danger.

Third.—A corollary: The arming and equipping of the militia in a uniform fashion. This result could be arrived at progressively, diminishing expenditures by degrees, and utilizing in a rational way the local appropriations so as to diminish the expense and charges upon the public treasury.

Fourth.—Idem. Establishment of a uniform system of instruction for all the militia. In our opinion, a commission

* Mr. Russell Thayer.

† Mr. Lloyd G. Bryce.

‡ Mr. Albert Ordway, *North American Review*, 1882.

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composed of the governors or adjutants general of the different States could arrange a common basis for these reforms (third and fourth) and agree upon the financial question with the Secretary of War.*

Fifth.—Closer relations between the Regular Army and the militia, which should be brought together as often as possible. For a long time it has been the rule to have all the regiments of militia inspected annually by regular officers, who report to the Inspector General of the Army at Washington. The results of these inspections are published in the reports submitted to the Secretary of War and to Congress. In this way, a moral influence merely can be exercised on the National Guards of the different States; penalties or rewards are evidently impossible.

Everywhere, the militia seems to begin to feel the need of association with the Regular Army, of listening to the advice of experienced officers. This tendency will become more marked as the veterans of the grand army of 1861–1865 disappear from the positions they now occupy in staff and line. These veterans, no doubt, are very respectable gentlemen, but they are too often mere routine soldiers, imbued with a spirit of disparagement with regard to modern military institutions. Fortunately there are exceptions to this rule, but, in a general way, the influence of the veterans, especially in small towns, is still considerable, and often destroys in part the benefit which might be derived from the annual inspections, or from the proximity of regular troops.

It is impossible to persuade these worthy folk that a few months or a few weeks of service thirty-five years ago, in a very subordinate position, are not enough to constitute them an infallible authority in modern tactics.

Sometimes officers of the Regular Army have been employed as permanent instructors of the militia. They have not only obtained excellent results, but they have been greeted by the National Guard and by the people with an enthusiasm which proves that their detail was in response to an actual need.

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*It may be said, however, that the new drill regulations do not appear to be adapted to the needs of the militia. Lieut. Col. W. H. Powell, Eleventh United States Infantry, complains that the framers have persisted in considering the Regular Army only, while this, in time of war, would have but a secondary role to play.—*N. D. Daily Tribune, July 31, 1893.*

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Tennessee, an order of the adjutant general, dated Decem-
1893, gives the command of the militia battalion, formed
mpanies A, B, C, D, and E, of Chattanooga and Knox-
to Captain Ward, of the Regular Army, then on duty as
orary instructor in Tennessee. The order mentions that
rder was made to satisfy the unanimous desire of the
any commanders.

1892, in Minnesota, a sergeant of regulars was assigned
ch militia company for some weeks. The militiamen, by
own statement, in this way acquired knowledge which
of theoretical instruction had not been able to teach

ere seems besides a definite intention to unite regulars
nilitia at the annual camps. The regulars derive advan-
from this plan; for, to a certain degree, it enables them
ke part in maneuvers on a large scale.

mp Stanley, in Texas, was particularly favored by the
nce of regulars in 1891; a battalion of the Twenty-third
try, four troops of cavalry, and a mounted battery were
nt with the militia. Even in the State of New York,
e the National Guard up to the present time has not
ared to desire affiliation with the regulars, Dillenback's
ry of the First U. S. Artillery, marched from New York
ekskill with a column of militia.

that is now necessary is perseverance in this direction.

th.—The maintenance of the militia on a reasonably
ive footing. The basis on which to make the selection
entioned at the beginning of this article between the
e militia and the unorganized reserve militia, would be
ult, if not impossible to determine. As has been seen,
election works itself out to a certain extent by the for-
n of voluntary organizations of all arms. There exists
esent in round numbers 100,000 militia called organized;
are, however, only partially organized. It might be
to have but half that number perfectly armed and
ped, and liberally supported by Congress, thus forming
tual and efficient reserve. The question is delicate, for
uld be bad policy to discourage the tendency of youth to
ice the trade of arms. In short, all depends on the amount
e appropriation. General McClellan,* supposing the
iary problem solved, omits the unorganized militia, and

**Harper's Monthly,* 1872.

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proposes as a maximum limit of the National Guard 260,500 men, of whom 222,300 should be infantry, 36,000 artillery, and 2,200 cavalry, the soldiers to give their time and good will only, their expenses not only being defrayed, but liberal pay allowed them during the period of instruction.

Seventh.—Generalization of annual encampments, the duration of which should not be less than one week of six complete days devoted to operations of war. General McClellan proposes two weeks; the Guard, organized according to his plan, would doubtless be made up of people of leisure.

Eighth.—Influencing the public opinion and military authorities of the different States, to the end that the training of the militia may be directed in a rational way. For example, to discourage the formation of heavy field batteries in the Northwestern States, or of cavalry in districts where it is difficult to secure mounts. Col. T. Anderson, Ninth U. S. Infantry, rightly proposes to favor the creation of siege batteries in the militia. This would present a double advantage: First, the instruction and mobilization of foot batteries are less complex than those of mounted, or horse batteries; second, the number of foot batteries in each of the five regular artillery regiments could be reduced and the number of mounted batteries increased.*

Ninth.—Reorganization of the staff on a rational footing—the suppression of fancy titles and sinecures.

Tenth.—Generalization of examination for officers proposed for advancement, and of noncommissioned officers who are candidates for higher grades.

Finally, there is one more reform which forces itself upon us, and it is a very serious reform. Banish politics from the militia. But that, alas, is Utopian.

* There are but ten regular mounted batteries in the United States.

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THE MILITARY AND NAVAL POWER

OF THE

UNITED STATES IN 1896.

FROM "PODER MILITAR Y NAVAL DE LOS ESTADOS UNIDOS EN 1896;"
MADRID, 1896.

TRANSLATED FROM THE SPANISH IN
THE OFFICE OF THE MILITARY INFORMATION DIVISION.

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ITARY AND NAVAL POWER OF THE UNITED STATES IN 1896.*

CHAPTER I.—ORGANIZATION OF THE ARMY.

MARY.—Territorial Military Division; Federal Standing Army; Ar-ament; State Militia; Distribution of the Federal Forces and the State litia; Contingent to Take up Arms in Case of War; Recruiting; Re-ntly Projected Improvements for the Land Forces; Effective Force the Federal Army, of the Militia, and of the Contingent Called on Take Arms in Case of War.

TERRITORIAL MILITARY DIVISIONS.

he extensive territory of the United States is divided into it military departments:

IRST. *Department of the East*, with headquarters at New k City, comprises the New England States, New York, Jersey, Pennsylvania, Delaware, Maryland, Virginia, st Virginia, North Carolina, South Carolina, Georgia, rida, Louisiana, Mississippi, Alabama, Kentucky, Ten-see, and the District of Columbia.

ECOND. *Department of the Colorado*, with headquarters at ver, is formed of the States of Colorado, Arizona, New ico, and the Territory of Utah.

HIRD. *Department of the Missouri*, with headquarters at cago, formed of the States of Michigan, Wisconsin, In-a, Illinois, Kansas, Arkansas, and the Territory of Okla-a.

OURTH. *Department of Dakota*, with headquarters at St. l, formed of the States of Minnesota, North Dakota, South ota, and Montana.

IFTH. *Department of the Platte*, headquarters at Omaha. States comprising it are Iowa, Nebraska, and Wyoming.

IXTH. *Department of Texas*, with headquarters at the Cap- San Antonio, comprises the State of Texas.

t must not be inferred that the opinions given and statements made n are sanctioned by the United States War Department; they are ished without correction or amendment, and are solely the ideas en-ined by the author. which are here presented as a foreign view of an rican subject.

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SEVENTH. *Department of Columbia*, with headquarters at Vancouver, consisting of the States of Oregon, Washington, and Idaho, and the Territory of Alaska.

EIGHTH. *Department of California*, with headquarters at San Francisco. It comprises California and Nevada.

Each one of these departments is under command of a major general, who resides at headquarters, where the central correspondence offices are located; and they are all subject to the general in chief of the War Department, which position is at present filled by Major-General Nelson A. Miles.

The armed force of the Republic is composed of two different parts, one formed of the Federal Army, properly so called, consisting of troops supported at the expense of the nation; the other by the union of those that, depending directly on the different States, are no burden upon the general expenses of the country.

THE FEDERAL STANDING ARMY.

The composition of the Regular or standing Army is as follows:

INFANTRY.—Twenty-five regiments, each divided into three battalions of four companies each. The regiment has a staff composed of 1 colonel, 1 lieutenant colonel, 1 captain—adjutant, a captain—quartermaster, and 5 captains without fixed employment. Each battalion is under the direct command of a lieutenant colonel, and the officers belonging to a company are 1 captain and 2 lieutenants. The total force of each one of the infantry regiments is 555 soldiers.

CAVALRY.—Ten regiments, each divided into three squadrons of four "troops" each and with a staff formed in the same manner as that of an infantry regiment. The squadrons are each commanded by a lieutenant colonel or a major, and the "troops" by a captain with two lieutenants under his orders. The total strength of each regiment may be calculated, approximately, at 650 enlisted men.

ARTILLERY.—Five regiments, each formed of three fortress battalions of four companies with a staff of 1 colonel, 1 lieutenant colonel, 1 captain—adjutant, and 1 captain—quartermaster. The battalions are commanded by lieutenant colonels and the commissioned strength of a company consists of 1 captain and 2 lieutenants. The total approximate strength of each regiment is 850 artillerymen. There is, moreover, a battalion

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of field artillery subdivided into two batteries, one of which is armed with 9-centimeter Krupp guns of steel, and the other with 8-centimeter pieces of the same make. Each battery consists of 1 captain, 2 lieutenants, and 100 artillerymen. Each battalion is commanded by a major.

ENGINEERS.—Of these forces there are two battalions which together make an approximate total of 500 men.

To sum up, the strength of the different fighting arms is as follows: 75 battalions of infantry, numbering 13,875 men; 120 troops of cavalry, which, at 54 men each, make a total of 6,480; 62 companies or batteries of artillery, whose total contingent is represented by 4,450 artillerymen; and the 500 men composing the engineer corps.

The total fighting strength is therefore some 25,000 men, to which should be added 3,000 distributed between the Military Academy of West Point, the War Department, and other military dependencies, making an aggregate of 28,000 men.

INDIAN TROOPS.—The preceding enumeration has not included a contingent formed by the recruiting of Indian troops, because the number at present composing it is so small that it does not represent an important factor in the military organization of the country. The troops to which we refer originated in the creation, in 1891, of eight squadrons of cavalry and nineteen companies of infantry, which have been gradually reduced to one squadron and one company. Among the different causes which determined such a reduction the most important is the peculiar character of the Indians, which makes it difficult for them to accommodate themselves to the requirements of military discipline. At present, the aforesaid squadron and company is formed into a single unit, which, constituting a body of cavalry of 66 men, has been reserved to garrison Fort Sill, Oklahoma.

AUXILIARY CORPS.—As to these corps, it may be stated that they are in suitable proportions to the effective force of the Army. It should be noted that the recent tendency of the nation is toward the development of its standing Army, in its looking to the improvement of these corps, and studying means of encouraging those individuals who are to compose them, as may be inferred from the measures set on foot to increase the Army Medical Corps, which in scarcity of personnel has reached the extreme limit.

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ARMAMENT.

The North American infantry is armed with the improved Krag-Jorgensen rifle, commonly called the *new magazine rifle*, which may be briefly described as having a caliber of 7.62 millimeters and a magazine holding five cartridges. The cavalry uses, besides the saber, the Springfield carbine and the Colt revolver. The artillery field gun is of the Parrott system.

For the infantry corps, there has also been recently adopted the Maxim machine gun, which, with a range of 3,000 meters and an initial velocity of 564 meters for its projectiles, is capable of 600 discharges a minute.

STATE MILITIA.

Besides the standing Army, there is an organized militia, which may be considered as troops of the second line, armed with guns of different models, and into whose composition enter the elements of all the corps, although there is a very small proportion answering to cavalry and artillery.

The contingent of these forces is very variable; in the last five years it has fluctuated between 102,000 and 112,000 men, with only 9,000 officers, which are the figures corresponding with the close of the past year, 1895.

DISTRIBUTION OF THE FEDERAL FORCES.

In the year referred to, 1895, the distribution of the Federal or standing Army over the whole country was as follows:

Military department.	Officers.	Troops.
East	525	7,000
Colorado	261	3,500
Missouri	307	4,350
Dakota	197	2,630
Platte	204	2,750
Texas	142	2,000
Columbia	133	1,770
California	111	1,600

DISTRIBUTION OF THE MILITIA OF THE COUNTRY.

The militia contingents of the several States differ much from each other; while that of New York is about 13,000 men, other States, like Utah, having none.

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The effective strength of these forces, distributed throughout the Republic, is as follows:

States.	Men.	States.	Men.
Alabama	2,960	Minnesota	1,801
Arizona	470	Mississippi	1,705
Arkansas	981	Missouri	2,415
California	4,944	Montana	526
North Carolina	1,782	Nebraska	1,086
South Carolina	5,440	Nevada	493
Colorado	827	New Jersey	3,915
Columbia (District of)	1,563	New York	12,810
Connecticut	2,771	New Hampshire	1,255
North Dakota	479	New Mexico	469
South Dakota	779	Ohio	6,125
Delaware	330	Oregon	1,575
Florida	1,011	Pennsylvania	8,614
Georgia	3,535	Rhode Island	1,476
Idaho	232	Texas	2,784
Illinois	4,777	Tennessee	1,794
Indiana	2,633	Vermont	784
Kansas	1,666	Virginia	3,221
Kentucky	1,331	West Virginia	900
Louisiana	1,249	Washington	1,702
Maine	1,164	Wisconsin	2,721
Maryland	2,118	Wyoming	415
Massachusetts	5,566	Iowa	2,315
Michigan	2,801		

CONTINGENT OBLIGED TO BEAR ARMS IN CASE OF WAR.

The United States Army has no reserve properly so called; but, in the event of impending national peril, the Constitution imposes the obligation to serve upon all citizens whose age is between 18 and 45 years. Those persons who, according to the statistics of 1891, come under these conditions, form a total of 6,786,995; but, considering that none of them has military instruction, not even the most rudimentary, it is clear that at first such an element can be considered of but slight importance in campaign service.

RECRUITING.

The recruiting of soldiers is by voluntary enlistment. The required conditions are: to possess necessary physical ability, to be of an age above 16 and under 35 years, and to be at least 5 feet 3 inches in height. The enlistment is for a term of five years, renewable at the desire of the parties interested.

So many are the difficulties encountered by the recruiting service that, among the expedients employed, it is worth

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while to mention the permission granted to heads of departments, by which recruiting officers may enter rural districts in the hope of greater success, a proceeding which certainly has not been warranted by the results.

Among the inconveniences arising from the imperfection of such a system, is the increasing number of desertions observed in the Army. This is of such an extent that the War Department has issued various orders directed toward lessening the frequency of this offense, which has always reached considerable proportions. Owing to this and the difficulty of recruiting, the regiments of the different arms seldom have their complete effective strength.

LATER IMPROVED SCHEMES FOR THE LAND FORCES.

The deficiencies in military organization being appreciated in the Republic, different Senators and generals have from time to time come forward with schemes showing the importance which, throughout the country, is going to be conceded to the necessity of modifying the fundamental principles on which such an organization rests.

Within the year 1894 alone, a multitude of plans were presented, among the most important of which are the following:

That of Mr. Outhwaite, who proposed an increase in the number of field batteries, abolishing on the other hand, ten companies of infantry.

That advocated by Mr. Oates, which tended toward increasing the strength of the artillery without on that account reducing that of the infantry.

That of General Schofield, predecessor in the Cabinet of the present Secretary of War, which advocated an increase of the total effective of the Army, because, since it had experienced no modification in twenty-five years, in spite of the doubling of the population, it had become unsuitable for a nation numbering 70,000,000 inhabitants.

That of Senator Sherman, which advised the adoption of measures in consonance with those prevailing in the armies of Europe.

Of the measures proposed in the House in 1895, it is worth while to cite one set forth in the annual report of the Secretary of War, in which, in order to be able to satisfy the demands of his Department, he asks for $51,945,643, or about

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78,072 in excess of the sum granted on the estimates for budget of the preceding year. In this report, with the ption of the credit allotted for river and harbor works, ncrease was proposed of what related to all the other ils appearing in the military estimates, and especially of relating to fortifications, to which section an increase ome $5,000,000 was made. In this bill it was proposed ise the strength of the Federal Army, adding two com-es to each infantry regiment and two more companies or eries to each artillery regiment.

nally, mention should be made of the resolution offered ongress by Mr. Cummings, asking that the Army con-of 10 regiments of artillery of 12 batteries, 10 regiments avalry of 12 troops, and 30 regiments of infantry of 12 panies.

he Secretary of War did not accept this last proposition, idering that the strength of the Army would be increased n excessive manner, to which Congress would assuredly pposed; but, taking into account the ideas which are nning to appear there, as well as the proposals in other utions offered in the House, he this year made a proposi- according to which the standing Army would receive an tion of 4,500 men, with which the total strength of the ing forces would be raised from 25,000 to about 30,000. n arm of the service would be reinforced by raising the ngth of its units, which would allow it to more readily mmodate the new effectives that it is supposed it would ve at various times, until the infantry and cavalry reached al of 40,000 men, with a proportion of two guns for each sand. This artillery would contain 6 regiments of 14 eries, making a total of 84, of which 14 would be light eries, and 70 foot artillery for the service of seacoast bat-s. In time of peace these 70 batteries would have a con-ent of about 4,000 trained artillerymen, a number which, he Secretary of War suggests, might be raised in case of ssity to 10,000, and even up to about 18,000 as the maxi-n, should circumstances require it.

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EFFICIENCY OF THE FEDERAL ARMY, OF THE MILITIA, AND OF THE CONTINGENT CALLED UPON TO BEAR ARMS IN CASE OF WAR.

It may be affirmed that the standing Army has in general sufficiently good instruction. The infantry excels in the practice of firing, on account of an abundant issue of ammunition and the added stimulus of prizes for good shots. It is the artillery that suffers most from need of sufficient instruction; for, although its officers do not lack competency, the little practice it has in the handling of modern matériel puts it in a condition of inferiority as compared with the field artillery of European powers.

According to the opinion of Professor Michie of the West Point Military Academy, copied in a report of our military attaché in 1891, "One is forced to recognize the fact that the personnel of the artillery is unequal to the task imposed upon it, although this does not depend upon the status of its members, but upon the indifference with which the Government considers its defects of organization."

The cavalry, scattered in separate squadrons over the Western territory, with no more tactics than open-order formations and exploration duty, and without any regimental instruction, constitutes so many mounted guerrillas rather than effective squadrons.

The State militia, although their instruction has been recently improved, owing to assembling where they have had brigade exercises, could not without difficulty answer the demands upon them if suddenly called into service. The complex duties which in that event they would at once have to perform, such as preparing subsistence, mounts and transportation, mustering in quite large masses for the execution of military operations to which they are unaccustomed—of fulfilling, in a word, all the duties of a soldier, without taking into account his necessary education—are circumstances of abrupt change to which such troops, in view of their civic-military organization, could not readily adapt themselves.

General Kelton, Adjutant General of the Army, speaking of these forces in the year 1890, expressed himself in the following manner: "Nevertheless, with many men at our disposal, we could not, under thirty days from the beginning of

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ostilities, count on more than 12,000 of the militia, partially ained, and 10,000 of the Army for the defense of Washing- n against possible invasion. Of the effective force of the ilitia regiments, 53,626 men have had instruction, although ot in the field, and they are ignorant of all the duties and ork which that imposes; 14,341 have received two weeks' gimental instruction and practice in corps duties, and 39,285 ave completed the instruction in brigade maneuvers; so that ly those grouped under the last two figures, or about 54,000, proximately, are ready for service and prepared to oppose emselves to the designs of an invading army."

In many States the militia as at present organized serves, the first place, for the maintenance of public order; and though with something more of experience certain regi- ents might if banded together make a creditable appearance, e may be assured that the militia as a body should not be garded as a true fighting force.

The cavalry and artillery of the militia are no less deficient an the infantry, from whatever point of view they are con- dered.

Moreover, such troops have no transportation service, sani- ry corps, or even a staff by means of which the forces of rious States might be able to cooperate with the Regular rmy or mingle harmoniously with each other, in order to be le to mobilize and concentrate as part of an army of oper- ions. Their organization is such that the militia troops ferred to are scarcely prepared, as a complete unit within ch State, to oppose an invasion of it.

The country confides in the militia on account of their record the war of secession, without considering that the belligerents both sides were in the same condition—without regularly ained forces—and that it took precisely the space of a year create real armies inured to fatigue and battle—a time for eparation upon which, assuredly, it would not count in case international warfare.

This explanation ended, one may with greater reason turn the third resource relied upon by the North American tion—that is, to the contingent of men, without any mili- ry instruction, called upon by legislative conscription to ar arms in case of war.

Not many years ago, General Schofield considered the mili- ry organization of his country very deficient, a judgment

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which might be repeated now, since conditions have changed but little. This general, setting forth his opinion, pointed out that the United States should keep a volunteer reserve of 300,000 men, completely organized, under good discipline and ready to be easily mobilized.

According to what has already been shown, there exists in the Republic no uniformity in armament; for, while the standing Army uses the Krag-Jorgensen rifle, the various State militia organizations have rifles of different models and calibers and generally greatly inferior to the regulation arm of the standing Army.

The industry of the country, on the other hand, can produce arms in great quantities in a short space of time. According to statistics set forth in the report already cited, and brought down to the close of the year 1891 by our military attaché, the North American government could at once arm about 100,000 men; the government works could construct 1,000 rifles and 1,000,000 cartridges daily; and private manufactories could turn out 3,000 rifles and as many revolvers, with 2,000,000 cartridges, in the same time. In this way, within a week, some 20,000 men could be armed; and, with two months of preparation, one might easily arm 280,000 by utilizing the material on hand in stock and manufacturing it in the said time, without counting on what the army and the militia of the States already have.

Finally, the deduction may be made that the military organization of the land forces of the North American Republic gives a peculiar character to its small army, consequent upon the marked difference existing between the Federal or standing Army and the elements composing the State militia, which is the chief difficulty with which the nation will have to contend in case of having to bring about a mobilization affecting all the elements constituting its military power. This power, although normally weak as to its organized forces, is, however, susceptible of rapid development, commanding, as it does command, large financial resources and numerous centers of production, and counting, as it does count, upon its very large population.

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CHAPTER II.—DEFENSE OF THE COASTS.

MARY.—General Plan Adopted for the Defense of the Coasts; For-esses and Fortified Points; Ports of Refuge; Waterways; Armament nd its Estimated Cost; Deficiencies Observed in the Execution of the lan Indicated; Description of the Forts and Defenses now Existing in he Peninsula of Florida and the Gulf of Mexico.

ENERAL PLAN ADOPTED FOR THE DEFENSE OF THE COASTS.

Starting from the principle, generally admitted in the North nerican Republic, that the defense of the country should ve for its object the repulse of all attacks by sea, and ing for granted that the land forces have no need of de-nding upon fortifications of any kind, but rather that the emy's troops should be prevented from disembarking, the versary's objectives are classified in the following order, ording to their importance:

First.—The great centers of population or production.

Second.—The navigation of the high seas.

Third.—The coast trade.

To the fleet is committed the protection of shipping on the h seas and the obstruction of the enemy's commerce, while ing against the opposing fleet, the defense of the coasts de-ving upon the remaining vessels in charge of it.

n order to succeed in this object, the service of coast pro-tion disposes the fixed defenses, such as mines and fortifi-ions, as well as the movable defenses, such as floating bat-es and torpedoes.

Fortifications will serve by their fire to repulse those vessels empting to approach the coasts near enough to bombard m, or seeking to force the channels.

Floating batteries are to take the place of such fortifica-ns, or complete their action, in case the latter should be ufficient in number by reason of the extent of the aforesaid nnels, or should be much exposed through close proximity he sea.

Mines, finally, will constitute the principal safeguards of nnels; and it is the torpedo boats' part to make blockades re dangerous, defend the mines, and to protect their own sels when pursued by a detached portion of the enemy's t.

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With these designs set forth, the general plan of defense comprehends:

First.—The protection, by the means indicated, of important centers, which must be secured from sudden onslaught and put in condition to repel attack.

Second.—The creation of fortified ports of refuge.

Third.—The organization of a system of waterways, parallel with the coast, securing continuance of the coast trade during hostilities; enabling the war vessels to concentrate and move under cover from the enemy; and permitting vessels of light draft, such as gunboats and torpedo boats, to navigate unmolested the whole length of the coasts.

Submarine mines placed in considerable numbers at all selected points are looked upon as the principal defense; and when the importance of these points is not such as to urgently demand the construction of fortifications, as in isolated harbors, the system of defense is completed by torpedo boats.

For points of secondary importance, barbette batteries are added; floating batteries being resorted to, when the configuration of the coast, is such that adequate protection can not be secured by means of stationary works.

Lastly, for populated places of great importance, all means at disposal are employed, first utilizing the sea as a defense as far as possible. For places of this class there are generally two lines of defense—an outer, the object of which is to keep the hostile squadron at a distance, and another and interior one, to hinder it from forcing the channels.

The cities themselves are not fortified, and thus are at the mercy of a fleet that might succeed in eluding this system of defense now provided for New York, Boston, and San Francisco.

FORTIFIED PLACES AND POINTS.

The fortified points, other than those just named, include the following:

ON THE ATLANTIC.—Narragansett Bay, Charleston, New London, Baltimore, Portland (Maine), Hampton Roads, Washington, Philadelphia, Savannah, Wilmington, Portsmouth, Cumberland Sound, Tennessee River, New Bedford, Penobscot River, and New Haven.

ON THE PACIFIC.—San Francisco, Portland (Oregon), and San Diego.

IN THE GULF OF MEXICO.—New Orleans, Key West, Mobile, Galveston, and Pensacola.

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PORTS OF REFUGE.

Respecting ports of refuge, there is a plan for construct- them at the following five points: Point Judith, at the rance of Long Island Sound; Point Orford, Oreg.; Santa z, Cal.; Delaware Bay; and Little Egg Harbor, N. J.

WATERWAYS.

n reference to this subject, there is a discussion as to cre- g a great naval station at League Island, which might s be made the center of an extensive line of interior com- nication parallel to the coast and protected from the sea, numerous outlets of which might easily be held.

The work for this main waterway, called the Second Coast e, includes first of all, an improvement of the ports situ- d upon it, especially Norfolk, Wilmington, Charleston, ufort, Savannah, and Darien; and the opening or im- vement of various waterways, viz: Raritan Bay, the uylkill and Delaware rivers, the canal between Norfolk Albemarle Sound, the Neuse River, of Beaufort and nlico waterways, the canal between Beaufort and the se, and Cumberland Sound.

On the northeastern frontier, the construction is contem- ed of a canal 20 feet deep between Buffalo, Chicago, and uth, which will be a sufficiently sheltered communication g the line of the Great Lakes; also the establishment orts of refuge on these lakes, and the acquisition by the vernment of Lake Portage Canal, which is the outlet of the t of the same name on Lake Superior.

Finally, and with the object of counteracting English influ- e in the region of Puget Sound, work is to be undertaken render the Columbia River and its principal affluents igable, with the result of making Portland an important ter. It is intended also to make a harbor of refuge at Port ord, to establish maritime communication between Port vnsend and Puget Sound, and to open a canal between the er and lakes Union and Samamish, creating, at the same e, a naval station at Point Turner in Puget Sound.

ARMAMENT AND ITS ESTIMATED COST.

he armament estimated for all these defenses amounts to 0 pieces of different caliber, 5 floating batteries, 150 tor- o boats, and 6,000 mines; and the appropriation necessary

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to carry this out reaches $127,000,000, or about 700,000,000 pesetas.

DEFICIENCIES OBSERVED IN THE EXECUTION OF THE PLAN INDICATED.

As may be seen, the defense of the coast follows a colossal plan, which has been in process of execution since 1891; but which, for its complete development, requires a period of twenty years of constant labor. To-day one may rest assured, upon the faith of an unexceptionable witness, General Miles himself, major general commanding the Army, that the coast defenses are extremely deficient.

The general, in an informal report of last year, says that it is important to push forward these defenses by all possible means, because foreign governments perfectly well know their present weakness; and thereupon he sets forth various considerations, summarized as follows:

Until the present time, not a gun has been put in place for the defense of Puget Sound. The pieces in position to defend the entrance of Columbia River in the neighborhood of the cities of Astoria and Portland are old and of little value. Something has been attempted in defense of the port of San Francisco; but, although several modern pieces of heavy caliber and some mortars have been put in position, there nevertheless lacks much to complete the general plan of defense of the principal port of the Pacific. The harbor of San Diego, as well as that of Puget Sound, mentioned above, is completely at the mercy of a foreign fleet.

Along the line of the Gulf of Mexico and on the Atlantic coast, the important cities of Galveston, New Orleans, Mobile, Key West, Savannah, Charleston, Wilmington, Washington, Baltimore, and Philadelphia are unprovided with modern ordnance. The few guns in position are old and of so little worth that it could be expected of none of these batteries to detain, not a squadron equipped with all the modern improvements of war, but even a single cruiser of the first class. The batteries at New York have received some mortars and modern guns, but there still lacks much to fully carry out the plan of defense of the metropolis. The cities situated on the coast to the north of New York are in the same condition as those to the south; the only advantage being that the cannon and mortars which have to guard them are placed on

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tried ground, the works they are to occupy being already constructed.

Lastly, the general adds that there are in the country two delusions which it would be well to dispel: one is, that the harbors and entrances to the rivers can be defended with torpedoes, the fact being overlooked that, given the great depth of these entrances, access to them of gunboats and torpedo boats is very easy; and the other delusion, that it is possible to defend the whole coast with the present Navy; the fact being, that in case of a foreign war, the proper work of the fleet is principally a struggle with the enemy's ships and the destruction of its commerce and ports, leaving the chief and richest cities of the States at the mercy of the adversary who, in a few days, could take possession of them.

From all that has been set forth, it may be rationally concluded that many years will have to elapse before the defensive system of the United States will reach the importance which to-day it has only in prospective.

At this date there are very few modern batteries that may be said to be established, such as the emplacements of Fort Hancock in New York Harbor, and the constructions on the hills to the south of Fort Point in the Bay of San Francisco for dynamite guns. Most of the fortifications are antiquated, and provided with old and defective guns.

Among these defenses, those of the greatest interest to Spain, because of their proximity to the Cuban coast, belong to the peninsula of Florida and the Gulf of Mexico, of which we will presently enumerate the principal harbors and anchoring grounds which might be objects of attack on our side, as well as points of disembarkation; serving later on as bases of operations or only as harbors of refuge for our vessels of war.

DESCRIPTION OF THE HARBORS AND DEFENSES NOW EXISTING ON THE PENINSULA OF FLORIDA AND THE GULF OF MEXICO.

The north coast of the Gulf of Mexico, from Cape Sable to the Rio Grande del Norte, has an extent of 1,300 miles.

The peninsula of Florida is the eastern boundary of the gulf, and is 275 miles long and 90 broad. It is low lying, and contains numerous lakes and pools. The shore of both sides is penetrated by gulfs and lagoons; and, particularly on the gulf side, is surrounded by keys, mud banks, and coral reefs. The keys form an almost continuous chain of reefs which

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extend from Cape Florida toward the southeast for a distance of 220 miles, and are so irregularly disposed that, without previous knowledge of the coast, vessels run a great risk in approaching it.

These keys are of extraordinary strategic importance, wherever many of them are situated in the straits of Florida. In hostile operations against Cuba they would possess great advantages for the United States, which might utilize them as the base of operations in offensive-defensive movements; and, on the other hand, should we succeed in possessing ourselves of them, they would be of immense value in our operations; because, aside from other advantages, we should be able to close all communication with the gulf, of which we would make ourselves masters by this one act.

Key West (Cayo Hueso), an islet just off the peninsula of Florida and situated at some 135 kilometers to the north of Havana, has an especial interest for us. It is the most important city of the State of Florida, as well for the number of its inhabitants, which is considerable, as for its commerce and industry.

The bay combines conditions which make it entitled to be considered one of the most important naval stations of the United States; but its defensive organization is far from being complete, as it consists only of a fort of masonry, called Fort Taylor, and a few batteries, all armed with old guns. The bay is divided into several channels, the most important of which, leading toward the north, has a depth of 30 feet and affords passage to ships of every class.

Lastly, the importance of this city is increased by the considerable activity of its harbor, where steamers coming from Havana and from the principal settlements of the coast frequently touch.

Charlotte Harbor (Bahía de Charlotte) has no defense and is of no great importance.

Dry Tortugas (Tortugas Secas) is a group of islets a little detached from the rest of the chain of reefs, and situated at the extreme southeast. The islets are of slight elevation, and inclose a deep and commodious bay, which is defended by a fort called Fort Jefferson, with batteries of very little importance.

Florida Harbor (Bahía de Florida) is situated between Florida and a cape to the north of Florida Keys (Cayos de Florida). It has no strategic value.

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The coast in the direction of Cape Sable, Cape Romano, and Punta Rassa lacks strategic importance, and is likewise covered with sand banks which permit the passage of vessels of only light draft.

Tampa Bay (Bahía de Tampa) is an estuary of from 6 to 10 miles wide, extending from Egmont Bay 22 miles in a northeasterly direction. It has two arms, one called Hillsborough Bay, 4 miles wide by 12 long; and the other, Old Tampa Bay, 6 miles wide by 12 long.

The city of Tampa is at the entrance of the bay, and is the terminus of the railway to Jacksonville, which serves as a means of communication between Tampa and Key West. There are no defenses, and its strategic value is insignificant, except in very close operations.

Cedar Keys (Cayos de Cedar) comprise islets without defensive works situated at the entrance of the Bay of Vacasassa. This entrance is difficult and owes its importance to a line of steamers which ply between Sadabana and Key West. The Suwauce River debouches 10 miles from the northeast end of Vacasassa Bay and has 5 feet of water at its mouth.

Appalachee Bay is an entrance in the extreme northeastern part of the Gulf of Mexico, very little visited and of little value. It is not defended.

St. Josephs Bay (Bahía de San José) is a beautiful, deep bay along the north coast of Cape San Blas. At the entrance it is 19 feet deep, but inside it reaches a depth of 32 feet; it is of very easy access, has a convenient anchorage, and is a mile wide at the entrance. Its acquisition would mean a great prize, for, besides serving as a base of naval operations, it might be utilized as a base of supplies for the whole coast of the Gulf of Mexico.

Pensacola Bay is 20 miles long, 4 or 5 wide, and 19½ feet deep. It is protected by the island of Santa Rosa, which is very low and ⅓ mile broad. The city of Pensacola is 10 miles distant from the entrance, and there is an arsenal 3 miles from the city. It is defended by Forts Pickens, MacRae, and Barrancas, all of masonry; the first two armed with old guns, and the last with rifled guns of small caliber. It is the best port of the Gulf coast, but not as good as St. Josephs Bay.

Mobile Bay is an estuary of more than 30 miles in length. At the entrance, and upon the eastern side, there is a basin 10 miles wide by 10 long, called Bon Secours Bay (Bahía del Buen Socotro).

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Mobile River debouches at the northwestern end of the ba and is navigable by steamers for a distance of 53 miles. It entrance is 2¾ miles wide, and is protected by Pelican an Sand islands, lying 3 miles south, neither of which is garri soned or defended. A canal, 21 miles long by 22 feet deep leads to the city of Mobile, which is defended by two earthe forts, Morgan and Baynes, in need of artillery. This city i the outlet for the major part of the cotton product of th United States, and its possession would cause grave disturb ance to commerce. To it converge a great number of rail ways, the most important being the Alabama and Ohio, th Alabama and Grand Trunk, the Louisville and Nashville and the Spring Hill.

Mississippi Sound is an arm of the sea contiguous to Mobil Bay, and connected with it by Pass Grant (Paso de Grant) The pass, like the bay, has very little depth.

The Mississippi River is the most important river of Americ and the largest of the world. The city of New Orleans i situated on its left bank at 120 miles from the mouth. It ha four entrances—the southern, 300 feet wide and 30 feet deep which is the most important; the southeastern, with 15 fee of water; the northeastern and Pass de Loutre, with 9½ fee each.

Forts Jackson and St. Philip stand on either side of th river, 70 miles below New Orleans. Both are of weak con struction and armed with old guns; their object being, whe erected, to hold the pass against a squadron attemping to tak possession of New Orleans—an undertaking which they coul not accomplish to-day. Following the course of the river there are other fortifications, without artillery, such as th forts of Ship Island, Mississippi Sound, Pike, the Rigolets Macomb Tower, and Dupre; and beyond these, at Bienvenue two batteries of guns, with an all-around fire.

Barataria Bay is an extensive lake, at the entrance of whic stands Fort Livingston, of small importance, and located 3 miles from the southeast pass of the Mississippi. This lak communicates with those of St. Denis, Grand Bayou, Little Perat, and Washa; and, by a canal, with the Mississipp River at Carrollton, 19 miles above New Orleans; the length of the canal is 110 miles, and it is navigable only by vessel of light draft.

Timbalier Bay, without defenses, is 10 miles wide and long, and navigable only by small vessels.

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erre Bonne Bay, of slight depth and without defenses, is ated to the north of Isle Caillou.

arlton Bay is 4 miles long, without defense, and situated ne west of Last (Dernière) Island.

tchafalaya Bay is 18 miles broad by 10 long. In its outer it has a depth of 10 feet; and within, of 8 feet. The afalaya River empties into the northwestern extremity of bay and is navigable by small steamboats for a course of miles. The railway from New Orleans to Opelousas ses the river 10 miles from its mouth. Since the bay s defense and is important, it might offer advantages for nsive operations.

alveston Bay is 30 miles long and varies in breadth from 10 miles. It is 1¾ miles wide at its entrance and is nded by Forts Bolivar and Point, both of masonry, but ed with smoothbore guns. The city of Galveston is sit- d on the bay, and is the most important of the State of as. It is a junction of the railways of the Gulf; the Col- o and Santa Fe, the International, the Great Southern fic, and the Texas and Mexico.

alveston Island is 24 miles long by 2½ broad. Pass San is between its southwest point and the Peninsula of ter; it is 8 feet deep, 9 cables broad, and completely lack- n defenses.

ne Brazos River has a course of 782 miles, and empties the Gulf, 38 miles from Galveston. Under ordinary cir- stances, it is navigable for 34 miles from its mouth, where eets the Columbia; but under exceptional conditions, or aps in a season of floods, it is navigable as far as Wash- on, 300 miles distant. The Texas Pacific railway is about les from the coast. This river has no protection and is of little military importance.

ne eastern coast, from Galveston to the Rio Grande, is ly all a sand beach and has no keys. The San Bernardo r is 8½ miles to the southwest of the Brazos; it is narrow of a depth varying from 5 to 7 feet. Following the coast e southwest, we meet Cedar Lakes, which communicate the sea at the western extremity; and, going farther n, we arrive at Canuy Grece.

atagorda Bay. This bay is extended by a canal 44 miles and of irregular course, on the banks of which is In- ola, the second city in importance in the State of Texas, which is not defended.

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The Colorado River empties into the Bay of Matagorda, 2 miles west of the city of Matagorda. It runs a course of 782 miles and is navigable, except in summer, for a distance of 270 miles—as far as the city of Austin, which has no defenses.

The bays of San Antonio, Aransas, and Corpus Christi are defined by a range of large islands, low and very narrow. These waters are of great strategic value, not only because they are navigable, but from the fact that, from Tiger Point to the Rio Grande del Norte, the depth is so great that boats can go as far as the Rio Grande coast.

CHAPTER III.—THE NAVY.

SUMMARY.—Recent Increase of the Fleet; Existing Difficulties respecting Recruiting and Remedial Plans; Present Strength; Armament; Arsenals; Vessels Composing the Fleet.

RECENT INCREASE OF THE FLEET.

Naturally, complementary to the gigantic efforts made to complete the system of coast defense, is a considerable addition to the naval power, which has been increasing in effectiveness since 1890; and, although the coast-defense system is still very far from being fully carried out, the same can not be said of the Navy, to perfect which, large sums have been appropriated, and the numerous Government arsenals and private workshops of every class throughout the country have contributed.

In consequence of this, the Republic has to-day at its disposal a considerable number of ships of war of recent construction, armed with guns of large caliber and supplied with all the modern improvements. These have been substituted for the few and almost useless monitors of antiquated model, which for ten years have constituted the floating matériel of the United States.

EXISTING DIFFICULTIES OF RECRUITING—REMEDIAL PLANS.

The North American Navy without doubt suffers from a serious defect, which up to this time has in vain occupied the attention of the governing powers, and which to a great degree renders useless the liberal expenditure incurred in building up the fleet; it is the lack of men for the ships' crews.

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The system of recruiting in use is, as in the land forces, the admission of volunteers desiring to serve; and, as the strength of the Regular Army is constantly seen to be diminishing by the plague of desertion, already stated to be so general, so, in the Navy, this reaches a still more considerable proportion, owing perhaps to the greater fatigue of sea life and to the ill treatment which the crews receive from their officers, notwithstanding the continued and energetic efforts of the Government to prevent it. Moreover, it should be taken into account that, by reason of the very growth of the country, a third part of the crews is formed of foreigners of various nationalities, living in the country without having cared to take out naturalization papers. This, even when it does not imply any risk of treason in case of war, explains without doubt the difficulties contended with in making up and controlling crews composed of men whose convenience induced them to enter the service, but who would not hesitate to abandon it for greater advantage to themselves.

Many are the schemes lately presented by Secretaries of the Navy to remedy these difficulties. Some of them have already been put into execution, such as assigning gunnery to the Marine Corps, so that the crew may have seamanship only. It is also proposed to raise their pay, to establish sundry official positions, and at the same time to ameliorate the treatment of seamen. There is also a plan to create a sort of naval reserve, to include all serviceable men of from 18 to 45 years of age who are or have been in the merchant service, and who would be subject to an annual drill for a period of thirty days; but up to the present time this idea has not been put into practice, nor has that of organizing a marine corps of six battalions, which might be attached to an equal number of maritime districts, each one having a certain number of vessels to be manned by them.

Certainly nothing of all this appears to give positive results, and the Secretaries of the Navy are constantly recurring to the difficulties which have been their stumbling block in manning with proper crews the ships which are continually building.

Such a defect in the North American Navy would not be easy to remedy in case of war, and although at the last extremity the seamen of the numerous merchant vessels might be made use of, they would not be skilled in the management of the complicated machinery of modern war ships.

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PRESENT STRENGTH.

At this date the number of men that the North American Republic can count upon for sea service is 7,062 for the armed ships, 3,177 for those in course of construction, 750 sailor apprentices, and 1,564 men for the different auxiliary services.

ARMAMENT.

The Lee 6-millimeter repeating rifle is adopted for the marines; it can deliver its charge of five shots in three seconds; 200 extra cartridges are carried by each individual.

As to the guns for the vessels, it can not be said that there are any regulations concerning them, since there exists a great variety of make and caliber, a result of the multitude of inventions which are daily made and tried. Nevertheless the matériel of war is plentiful and generally of excellent quality, and it may be said respecting these guns that the North Americans are foremost, the most progressive of nations, although this fact makes more apparent the defect already indicated, of the crews' want of practice.

ARSENALS.

The United States have fourteen arsenals, established at the following points: Alleghany, Benicia, Augusta, Watertown, Watervliet, Columbia, Fort Monroe, Indianapolis, Frankford, Kennebec, New York, San Antonio, Rock Island, and Sandy Hook.

Of these, the most important are at Benicia, Columbia, Indianapolis, Frankford, and New York.

SHIPS COMPOSING THE FLEET.

Besides the merchant ships of great tonnage and speed, which at the outset of danger the North American Republic could arm as cruisers, the navy contains the following described ships of war:

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SHIPS OF THE NORTH AMERICAN NAVY.

Names.	Displacement.	Length.		Breadth.		Mean draught.		Screws.	Horsepower.	Cannon and machine guns.	Torpedo tubes.	Date of launching.	Speed.	Capacity of coal bunkers.
ARMORED.														
	Tons.	*Ft.*	*In.*	*Ft.*	*In.*	*Ft.*	*In.*	*No.*			*No.*		*Knots.*	*Tons.*
Ajax (1 turret, iron)	2,100	226	4	43	7	13	9	1	340	2 fifteen-inch smoothbore		1864	6	160
Alarm (iron)	720	172	6	29	3	11	2	1	800	1 six-inch, 2 rapid firing, and 1 Maxim		1873	11	------
Amphitrite (2 turrets, iron)	3,990	249	4	55	9	14	3	2	1,600	4 ten-inch, 6 rapid firing, and 2 Maxim		1883	12	300
Brooklyn (steel)	9,250	400	6	64	0	24	0	2	16,000	8 eight-inch, 28 rapid firing, and 4 Maxim	6	------	21	1,650
Comanche (1 turret, iron)	1,875	200	2	45	11	11	6	1	350	2 fifteen-inch smoothbore		1863	6	160
Canonicus (1 turret, iron)	2,100	226	4	43	7	13	9	1	320	2 fifteen-inch smoothbore		1864	6	160
Catskill (1 turret, iron)	1,875	200	2	45	11	11	6	1	350	2 fifteen-inch smoothbore		1863	6	150
Indiana (steel)	10,231	348	0	69	3	24	0	2	9,000	4 thirteen-inch, 8 eight-inch, 28 rapid firing, and 4 Maxim	6	1893	16	1,800
Iowa	11,286	360	0	72	0	24	0	----	11,000	4 twelve-inch, 8 eight-inch, 32 rapid firing, and 4 Maxim	6	------	16.5	2,000
Jason (1 turret, iron)	1,875	202	0	45	11	11	6	1	350	2 fifteen-inch smoothbore		1864	6	150
Katahdin (steel)	2,050	243	0	43	6	15	0	2	4,800	4 rapid firing		1893	------	------
Lehigh (1 turret, iron)	1,875	200	2	45	11	11	6	1	350	2 fifteen-inch smoothbore		1864	6	150
Mahopac (1 turret, iron)	2,100	226	4	43	7	13	9	1	320	2 fifteen-inch smoothbore		1865	6	160
Maine (steel)	6,682	310	0	57	0	21	6	2	9,000	4 ten-inch, 6 six-inch, 16 rapid firing, and 4 Maxim	7	1890	17	822
Manhattan (1 turret, iron)	2,100	226	4	43	7	13	9	1	320	2 fifteen-inch smoothbore		1865	6	160
Massachusetts (steel)	10,231	348	0	69	3	24	0	2	9,000	4 thirteen-inch, 8 eight-inch, 4 six-inch, 24 rapid firing, and 4 Maxim	6	1893	16.25	400
Miantonomah (2 turrets, iron)	3,990	249	4	55	9	14	3	2	1,600	4 ten-inch, 6 rapid firing, and 2 Maxim		1876	10.5	330
Monadnock (2 turrets, iron)	3,990	249	4	55	9	14	3	2	1,600	4 ten-inch, 6 rapid firing, and 2 Maxim		1883	12	330
Montauk (1 turret, iron)	1,875	200	2	45	11	11	6	1	350	2 fifteen-inch smoothbore		1864	5.5	160
Monterey (steel)	4,138	256	0	59	0	14	9	2	5,072	2 twelve-inch, 2 ten-inch, 8 rapid firing, and 2 Maxim		1891	14.4	200
Nahant (1 turret, iron)	1,875	200	2	45	11	11	6	1	350	2 fifteen-inch smoothbore		1863	6	160
Nantucket (1 turret, iron)	1,875	200	2	45	11	11	6	1	350	2 fifteen-inch smoothbore		1863	5.6	160

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SHIPS OF THE NORTH AMERICAN NAVY—Continued.

Names.	Displacement.	Length.	Breadth.	Mean draught.	Screws.	Horsepower.	Cannon and machine guns.	Torpedo tubes.	Date of launching.	Speed.	Capacity of coal bunkers.
ARMORED—cont'd.	*Tons.*	*Ft. In.*	*Ft. In.*	*Ft. In.*	*No.*			*No.*		*Knots.*	*Tons.*
New York (steel)	8,500	380 6	64 10	23 3	2	16,500	6 eight-inch, 24 rapid firing, and 4 Maxim	6	1891	21	1,150
Oregon (steel)	10,231	348 0	69 3	24 0	2	9,000	4 thirteen-inch, 8 eight-inch, 4 six-inch, 24 rapid firing, and 4 Maxim	7	1893	16	1,800
Passaic (1 turret, iron)	1,875	200 2	45 11	11 6	1	350	2 fifteen-inch smoothbore	----	1863	6	160
Puritan (2 turrets, iron)	6,060	280 0	60 1	18 1	2	370	4 twelve-inch, 16 rapid firing, and 4 Maxim	----	1884	13	580
Terror (2 turrets, steel)	3,990	249 4	55 9	14 3	2	1,600	4 ten-inch, 6 rapid firing, and 2 Maxim	----	1883	12	330
Texas (2 turrets, steel)	1,300	290 0	64 7	22 6	2	8,600	4 twelve-inch, 6 six-inch, 16 rapid firing, and 4 Maxim	6	1892	17	850
Wyandotte (1 turret, iron)	2,100	225 0	43 7	13 6	1	320	2 fifteen-inch smoothbore	----	1864	6	160
NOT ARMORED.											
Adams (wood)	1,365	183 9	35 0	14 2	1	550	1 eight-inch, 4 nine-inch smoothbores and 3 Maxim	----	1874	9.8	150
Alert (iron)	1,020	173 10	31 10	12 10	1	656	1 eight-inch, 4 nine-inch smoothbore	----	1874	9	140
Alliance (wood)	1,375	183 9	36 0	14 2	1	774	1 eight-inch, 4 nine-inch smoothbore, and 1 Maxim	----	1875	9	130
Atlanta (steel)	3,189	270 0	42 0	18 0	1	3,511	2 eight-inch, 6 six-inch, 6 rapid firing, and 6 Maxim	----	1872	16.33	490
Baltimore (steel)	4,600	315 0	48 6	20 6	2	10,750	4 eight-inch, 6 six-inch, 8 rapid firing, and 6 Maxim	5	1878	20.6	1,140
Bancroft (steel)	838	160 0	32 0	11 6	2	1,213	10 rapid firing and 2 Maxim	2	1892	14.37	200
Bennington (steel)	1,750	230 0	36 0	14 0	2	3,533	6 six-inch, 6 rapid firing, and 4 Maxim	2	1890	17.5	400
Boston (steel)	3,189	270 0	42 0	18 0	1	3,780	2 eight-inch, 6 six-inch, 6 rapid firing, and 6 Maxim	----	1894	15	490
Castine (steel)	1,050	184 4	32 0	12 2	2	1,600	14 rapid firing and 2 Maxim	----	1892	16.2	250
Charleston (steel)	4,010	300 0	46 2	19 6	2	7,500	2 eight-inch, 6 six-inch, 10 rapid firing, and 6 Maxim	4	1888	18.7	800
Chicago (steel)	4,500	315 0	48 2	19 0	2	5,248	4 eight-inch, 8 six-inch, 2 five-inch, 4 rapid firing, and 8 Maxim	----	1885	16.3	940
Cincinnati (steel)	3,183	291 3	42 0	18 0	2	10,000	1 six-inch, 22 rapid firing, and 2 Maxim	6	1892	19	556
Columbia (steel)	7,475	412 0	58 2	22 6	3	21,500	1 eight-inch, 2 six-inch, 24 rapid firing, and 4 Maxim	6	1892	22.8	2,400

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Concord (steel)	1,700	230	0	36	0	14	0	2	3,513	6 six-inch, 6 rapid firing, and 4 Maxim	2	1890	17.3	400
Detroit (steel)	2,000	257	0	37	0	14	6	2	5,400	2 six-inch, 18 rapid firing, and 2 Maxim	6	1892	18.71	435
Dolphin (steel)	1,481	239	6	31	10	14	2	1	2,300	4 rapid firing and 6 Maxim		1894	15.5	310
Essex (wood)	1,375	183	9	36	0	14	2	1	800	1 eight-inch smoothbore, 4 nine-inch smoothbore, and 2 Maxim		1874	10	140
Lancaster (wood)	3,250	236	3	45	11	19	1	1	750	10 eight-inch, 4 rapid firing, and 5 Maxim		1859	9.6	288
Machias (steel)	1,050	184	4	32	0	12	2	2	1,600	14 rapid firing and 2 Maxim		1892	15.46	250
Marblehead (steel)	2,000	257	0	37	0	14	6	2	5,400	2 six-inch, 18 rapid firing, and 6 Maxim	6	1892	18.94	435
Marion (steel)	1,900	216	6	37	0	16	5	1	1,172	6 nine-inch smoothbore, 1 eight-inch, and 3 Maxim		1873	11	156
Minneapolis (steel)	7,475	412	0	58	2	22	6	3	21,000	1 eight-inch, 26 rapid firing, and 4 Maxim	6	1893	22	2,400
Mohican (steel)	1,900	216	6	37	0	16	5	1	1,172	1 eight-inch, 8 nine-inch smoothbore, and 3 Maxim		1882	11	150
Montgomery (steel)	2,000	257	0	37	0	14	6	2	5,400	2 six-inch, 16 rapid firing, and 2 Maxim	6	1892	18.87	435
Newark (steel)	4,083	310	0	49	0	18	9	2	8,869	12 six-inch, 10 rapid firing, and 7 Maxim		1890	19	850
Number 1 (steel)	750	260	0	27	0	8	4	2	6,000	11 rapid firing and 2 Maxim	6	------	23	------
Olympia (steel)	5,800	340	0	53	0	21	6	2	13,500	4 eight-inch, 30 rapid firing, and 4 Maxim	6	1892	21.69	1,893
Petrel (steel)	890	176	3	31	0	11	7	1	1,513	4 six-inch, 2 rapid firing, and 4 Maxim		1888	13.7	168
Philadelphia (steel)	4,413	315	0	48	6	19	3	2	10,500	12 six-inch, 8 rapid firing, and 7 Maxim	5	1889	19.7	1,175
Raleigh (steel)	3,183	291	3	42	0	18	0	2	10,000	1 six-inch, 22 rapid firing, and 2 Maxim	6	1892	19	556
Ranger (iron)	1,020	173	10	31	10	12	10	1	656	1 Parrott and 1 Maxim		1874	10	127
San Francisco (steel)	4,083	310	0	49	2	18	9	2	10,400	12 six-inch, 10 rapid firing, and 7 Maxim	6	1889	20.2	680
Vesuvius (steel)	930	246	0	26	6	10	7	2	4,450	3 dynamite and 3 rapid firing		1888	21.65	150
Yantic (wood)	900	180	5	29	6	12	2	1	670	1 eight-inch, 2 nine-inch smoothbore, and 1 Maxim		1878	8	125
Yorktown (steel)	1,703	230	0	36	0	14	0	2	3,660	6 six-inch, 6 rapid firing, and 4 Maxim		1888	17.2	400

By examination of later tables it is found that the North American Navy numbers 29 armored ships, mounting 432 guns of different systems, with a tonnage of about 122,000. Of ships of war not armored there are 35, with 623 machine guns and cannon, also of various patterns and caliber, and of about 91,000 tons.

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PRACTICE MARCH

OF A

SWISS ARTILLERY BATTALION,

January and February, 1897.

By Lieut. CERESOLE, Adjutant A. D. ⅓.

Translated from the Revue Militaire Suisse

By First Lieut. HENRY A. REED, Second U. S. Artillery.

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PRACTICE MARCH OF A SWISS ARTILLERY BATTALION,

JANUARY AND FEBRUARY, 1897.

The following account, submitted by request of the *Revue Militaire Suisse*, is without literary pretension, being simply notes, or a brief description of the winter march of a battalion of artillery, given to acquaint our comrades with the happy or unpleasant expedients resorted to during this period, so that they may profit by our experience should the occasion arise.

For the sake of discipline and good fellowship, we will abstain from individual or personal criticism; and, because of their lack of military interest, will omit the picturesque details with which a march of this character naturally abounded.

THE GENERAL SCHEME.

By orders, dated December 21, 1896, the Federal Council decided to assemble the batteries of the battalion (A. D. ½) for instruction from January 21 to February 9, 1897; the course to comprise: Mobilization at Morges, a practice march from Morges to Thoune, the return to Morges under certain tactical suppositions and the demobilization at the latter point, all according to a programme arranged by the army commander, chief of artillery instruction, and the commanding officer of the regiment.

DIARY OF EVENTS.

Tuesday, January 19.—Cloudy, temperature + 6° C.; assembly of the regimental staff at Morges at 9.30 a. m.; the commanding officer, Major Bellamy, of Geneva; the adjutant, First Lieutenant Ceresole, of Berne; Major Galiffe of the general staff, of Geneva, attached for personal instruction; Batteries 3 and 4, commanded respectively by Captains Cossy, of Lausanne, and Yersin, of Pont-Farbel, with their officers and men, except the cannoneers. Routine work. While preparing the horses, forming teams and adjusting harness, the horses were sent by sections to the arsenal courtyard to be shod; all of them, this day and the two following, had their

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old shoes removed and replaced, cold, with prepared ordnance shoes, the four battery farriers being reenforced for this work by ten supplementary military farriers under orders of the chief farrier of Régie. From 7 to 9 p. m. night horseshoeing was practiced, the arsenal court being lighted by three Wells lamps. From 8 to 10 p. m. the officers were assembled at the "Hotel du Port," where Major Bellamy explained the plan of march and its object.

Wednesday, January 20.—Reveille 5.30 a. m.; cloudy; temperature + 5° C.; snowing intermittently; sick, none. The cannoneers of the two batteries arrived at 9.30 a. m. Routine work. The matériel is as follows: For each battery, 6 pieces, 6 caissons and its reserve, which latter, for Battery 3, consists of 1 mess wagon with limber attached, 1 experimental battery wagon and 1 infantry baggage cart (for provisions); for Battery 4, 1 battery forge (ordinary), 2 infantry baggage carts (one of the new model as a battery forge, the other for provisions), and 1 mess wagon (ordinary). Ammunition carried by each battery: 240 shell, 600 shrapnel, 570 cartridges, 110 drill charges with plugs, and 600 revolver cartridges. Effective personnel and horses, now complete, comprise 3 staff officers and 6 horses; for each battery, 8 officers, 132 noncommissioned officers and men, and 106 horses. The soldiers are selected, and belong to the eight youngest classes. Each man receives from the arsenal a woolen belt and a pair of gloves, and each cannoneer has in addition cloth leggins. The general order and the articles of war are read; address by the commanding officer. At 7 p. m. the battery which had its horses shod first is practically ready for the march.

Thursday, January 21.—Reveille 5.30 a. m.; cloudy; temperature + 6° C.; showers; sick, 2 men. School of the soldier, section, and piece, including firing; shoeing and formation of teams finished at noon; from 3 to 6 p. m. practice marches by battery and battalion toward St. Prex and St. Sulpice.

Friday, January 22.—The march from Morges to Villeneuve, 25 miles. Reveille 5.30 a. m.; rainy; temperature + 7° C.; sick, 1 man, 1 horse. Started 7.40 a. m. Hourly halts: At Préverenges, 8.20 a. m.; Chavannes, 9.30 a. m.; Chamblandes, 10.40 a. m. On leaving Lutry trotted to Rivaz, 5 miles in thirty-five minutes; Rivaz, 12 o'clock; Vevey, 1.40 p. m.; Ronvenaz, 3.20 p. m.; Villeneuve, 4.20 p. m. During the day, three trots of from twenty to thirty-five minutes each. Rate of marching, 3 miles per hour; 1 pole broken and

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ced. Colonel Hebbel and Major Souvairan witnessed rrival of battalion at Villeneuve.

urday, January 23.—The march from Villeneuve to , 13 miles, elevation 1,970 feet. Reveille 5.30; cloudy, frost, and frozen surface; temperature −2° C.; sick, 2 1 horse; 1 horse left behind at Vevey. Started 8 a. m. eaving Remaz, formal exercise in taking up position st Chambon (scale of map, $\frac{1}{100000}$); firing drill from .55, using twenty-four drill charges; Roche, 10.10; halt 10.35 to 11, to attach calks; Aigle, 11.45; halt at Font- 1 hour; all dismount. Sépey, 3.45 p. m., and parked in nn on the road. Between Aigle and Sépey depth of snow ased from 1 to 15 inches and snowing heavily; tempera- −2° to −5°. Rate of marching for the day, 1.86 miles our. The commanding officer and adjutant had arrived . m. and reconnoitered the neck, on foot, as far as the nit.

nday, January 24.—Snowed hard all day; temperature C. at Sépey, −12° at Comballaz, and −16° at Mosses; le 5.30; sick, 1 man, 1 horse; attached sled runners to a ber of the carriages—in some cases to all the wheels, in s to pairs only. Started at 7.45 a. m. in the following : 40 cannoneers with tools; all the officers' horses led by oneers (noncommissioned officers' and trumpeters' horses to reenforce the teams); pieces, caissons, and reserve of ry 4; pieces, caissons, and reserve of Battery 3. Snow nd fine, depth increased from 24 to 43 inches; beaten tracks too narrow to follow by 15 inches; horses have pulling although slope does not exceed 13°.5; carriages shed with sled runners harder to draw than the others, ls sink deeply notwithstanding the runners, which act hocks. Drivers are dismounted from most of the teams, he runners are removed.

1,000 yards beyond Comballaz is the Thésex bridge, with parapets and buried in snow. The road here ascends makes a sharp turn; leaders of the first piece turn too and carriage strikes the parapet. The carriage has to oved to middle of the roadway, the snow cleared away, he teams reenforced; nearly all the carriages of Battery d especially those of the reserve, were hindered at this . The battery teams are doubled; carriages arrive at ballaz (0.82 mile) at 1 p. m., where the horses are given ion of oats.

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Fig. 37.—Crossing the Thésex Bridge; piece of Battery 4, with reenforced teams.

Fig. 38.—Just before reaching Comballaz; piece of Battery 4 drawn by five pairs of horses.

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Fig. 39.—At Comballaz; first trial of Tandem Driving; piece with runners on rear wheels.

Fig. 40.—Between Comballaz and Mosses; first difficult path.

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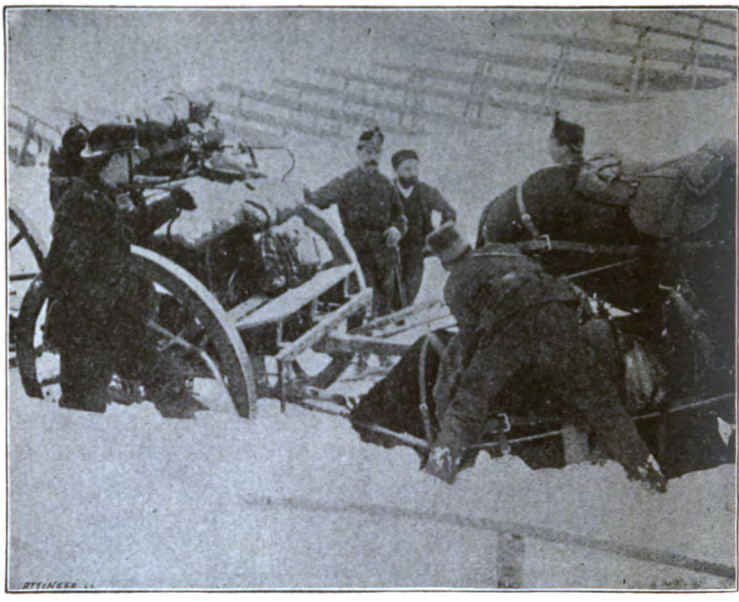

Fig. 41.—Difficulties with Horses hitched to the Pole.

Fig. 42.—Condition of the Roadway between Mosses and Lécherette.

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m here to Mosses (0.86 mile) the slope (ascent) is hardly
ciable, but the road is still narrow so that horses and
s plunge heavily into the unbeaten snow—in some places
deep; horses up to the breast and wheels above their
It is proposed to hitch up tandem with or without a
at the pole (in the latter case with or without cannoneers
port the pole); some carriages are unlimbered and the
drawn separately or with prolonge. Battalion assembles
0 p. m.; it is decided that Battery 4 shall encamp at
s, while Battery 3 is to leave its cannoneers and mate-
Comballaz and send its horses back to Sépey; the adju-
s charged with the necessary purchases of bread, meat,
ats for the following day. The first piece reaches Mosses
) p. m.; at 6 p. m. six pieces and four caissons of Bat-
are there; two caissons and the reserve remain at Com-
; temperature −18° C.; several horses shiver violently
he cold and some absolutely refuse to work. The train
eted at the Chalet des Communs (thirty-five minutes
t from the carriages) and the cannoneers in houses sup-
with heat. Distance traversed by leading piece, 4.5
in nine hours, a rate of 0.5 mile per hour.

soon as Battery 4 has made way for it, Battery 3, with
erve, is moved, without doubling teams, to Comballaz,
it arrives at 2.30 p. m.; the horses are given oats and
returned by file to Sépey; cannoneers take shelter at
allaz in houses capable of being heated. Distance trav-
2.7 miles in six and one-half hours; rate, 0.42 mile per

nday, January 25.—During the night 12 inches of snow
temperature −20° C. at Mosses and Comballaz, −10° at
; morning clear and calm; sick, 2 men.

early as 6.30 horses of Battery 3 left Sépey; hitched up
mballaz at 8 o'clock. The column, closed up, passed
aissons and the reserve of Battery 4 echeloned along the
f the road; the cannoneers of this battery are to place
back on the road; arrive at Mosses at 11, where Battery
bout to hitch up its pieces.

enteen horses and five sleds have been requisitioned at
and Comballaz to reenforce the teams and draw sub-
ce stores for the day.

e fine snow is extremely fatiguing to both men and
s, but the horses, arranged by fours in tandem, pull

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better and easier than the night before. Beyond Mosses obliged to leave the road at two points because of the accumulation of snow and the dangerous proximity of ravines; described three triangular routes through the fields; drifts from 6 to 10 feet deep. In the ascent from Lécherette, as the roadway was higher in the center and but 5 feet wide, the carriages slid to either side; they were hauled back by reenforcing the teams, removing the snow, and placing boards under the wheels. Hot coffee and a ration of oats at Lécherette.

Descended slowly to Etivaz by a narrow winding road; time required, 1.35 to 4.40 p. m.; battery forge and the two mess wagons which were left behind and loaded upon country sleds rejoined easily at a trot. Hitched the usual way; road widens and descends gently. Assembled at Château-d'Œx, the men singing, between 4.15 and 6.30 p. m. (reserve included). Applied for and obtained from Berne, by telegraph, authority to give horses an extra half ration of oats.

Distance traversed by leading carriage 9.3 miles, rate of marching 1.86 miles per hour.

Tuesday, January 26.—The march from Château-d'Œx to Zweisimmen (15 miles). A violent wind and snow storm during the night. Reveille at 5.30, snowing heavily; temperature −4° C.; sick, 1 man. Started at 8 a. m., the trumpets sounding on the public square; road open, wide enough and well beaten; 20 inches of snow. Rougement at 9.30 a. m. Halt at Gessenay from 10.40 to 11.30; hot coffee and oats; four sleds requisitioned to transport baggage and oats.

Road ascends gently to Grands-Marais (Saanenmöser); heavy snowstorm from the rear; temperature −8° C.; fifty civilian laborers trying to keep the road free from snow, although a violent wind tends to fill it up again; drifts from 3 to 5 feet high already cut through. During the march from Höhenegg, and without halting, hot grog is given to each man. Reached Zweisimmen at 3.15 p. m. Horses groomed and batteries parked. School of the piece and of firing; rate of marching, 2.16 miles per hour.

Wednesday, January 27.—From Zweisimmen to Thoune (25 miles). Reveille 5.30; stopped snowing during the night, but begins again heavily, and will continue all day; temperature −5° C.; sick, 3 men. Started 7.45 a. m. On leaving Gwatt (near Thoune), at 2.35 p. m., a tactical supposition is given to us, under which practice firing is to take place on

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ain of Thoune. The battalion advances at a trot along oad, but suddenly receives orders from the instructor ief to proceed immediately to quarters; the firing is ff, the snow falling so densely as to hide the targets. ed Thoune, trumpets sounding, at 3.30 p. m. Some of nhabitants cheer the Vaudois artillerymen. Men put rracks, warm bath to entire command; soup; rate of ning, 3.3 miles per hour; four trots of twenty minutes

ursday, January 28.—Reveille at 6; sick, 1 man, 1 horse; ng and blowing intermittently; 12 inches of snow on ain; temperature −4°; school of firing (shell), by battery anders and chiefs of section, forty rounds per piece; s remain in stable, except one team per carriage. After . m. indoor exercise; inspection in marching order by ental commander; needed material replaced; rest.

day, January 29.—Reveille at 6; sick, 1 man, 2 horses; kind of weather as night before. Field firing with ed ammunition from 8.30 till noon, 150 shrapnel per y. After 2.30, routine exercise, school of the soldier iece, and preparation for departure.

urday, January 30.—Reveille at 5.30; stopped snowing; erature −3°; 1 horse on sick report. When leaving, at the department order to remain two more days is con- l; reserves follow the battalion to Uetendorf and return oune by Thierachern. Pieces and caissons leave for ndorf. At 10.10 a. m. take position east of Kirchdorf at 04, against artillery supposed to be north of Oppligen; y-four drill charges. Take up second position ¼ mile er east, advancing by battalion front; forty-eight drill es; cease firing at 10.50 a. m.; order read to the troops ing return to Thoune. Kiesen, 11.05; trot from Dorn- n to Thoune (3.01 miles); barracks at 12.20. Distance rsed, 12 miles; rate, 3 miles per hour. Afternoon: Clean- p; school of the soldier; inspection of fatigue suits.

nday, January 31.—Reveille 6.30; clear weather; tem- ure −3°; sick, 1 man, 2 horses. Indoor work. Divine e at 10 o'clock in riding hall by chaplain of First Infan- lso a few trumpet flourishes and patriotic songs. Men ed on pass; most of them went to Interlaken or Berne; es at retreat.

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Monday, February 1.—From Thoune to Schwartzenburg (18.6 miles). Reveille 5.30; sick, 1 man. Started 7.45; immediately began to snow heavily; temperature −8°. Halted at Uetendorf at 9.10; Riggisberg, 11.10. Preparations for an engagement; Battery 3 takes the lead at a trot, and, by a quite steep (18°) ramp covered with 16 inches of snow, and through the fields, gains Buchen heights (southeast of Schwarzenberg). Battery 4 is moved out and posted to the north of and covered by Henzischwand. Firing from 2 to 2.50 p. m., twenty-four practice rounds. March resumed; temperature −3°. Snow continues falling heavily. The route leads through snow trenches, exceeding 10 feet in depth, prepared by some fifty civilian laborers. Reached Schwarzenburg 3.15 p. m. Rate of marching 3.15 miles per hour; thawing and lots of rain during the night.

Tuesday, February 2.—Schwarzenburg to Fribourg (10.6 miles). Reveille 5.30; cold and hard rain, which will continue all day; slippery; temperature +2°; sick, 1 man. Started at 8 a. m.; notwithstanding the ice rings, carriages slid and swerved a good deal in descending to Singine; three horses fell without injuring themselves. On entering Heitenried at 9.40 a. m. prepared for an engagement; took position by battalion, at point 825, against enemy northwest of us. Fired thirty-six drill rounds between 10 and 10.20. Halted at St. Antoni at 11.05; Tavel at noon. Crossed the suspension bridge, which vibrates excessively, with 16 yards interval between carriages and keeping exactly in center of roadway. At 2 p. m. parked in Cathedral Square at Fribourg; the horses mounted and by file, and the cannoneers by battery, descend to the barracks. Rate of march, 1.86 miles per hour.

Wednesday, February 3.—From Fribourg to Moudon through Romont (24 miles). Reveille 5.30; driving rain, ice patches; temperature +4°; sick, 1 horse; 1 man sent to the hospital; started at 7.45 a. m.; Chénens at 11.20; trotted to and reached Romont at 11.55—5.4 miles in thirty-five minutes. Prévonloup 12.50; trotted to Curtilles, 3.6 miles, in twenty-five minutes; Lucens 1.35. At 2 p. m. prepared for engagement at 1¼ miles from Lucens; took position, echelon by battery, at Granges-Verney; fired thirty-six drill rounds at enemy supposed to be at Beauregard. Colonels Ceresole and David, with Lieutenant Colonel Melly and Captain Aucker thaler were present at the firing and accompanied the battalion

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loudon, where we arrived at 3.40 p. m. Rate of march-
3½ miles per hour.

ursday, February 4.—From Moudon to Orbe (16 miles).
eille 5.30; cloudy; snow disappearing and ground soft.
perature +8°; sick, 1 horse; 2 men sent to the hospital.
ed at 8 a. m. from Sottens. Battery 4 took the lead at a
and, at 10.40, opened fire from position south of Fey, on
ery 3 posted between Peyres and Possens (thirty drill
ds), and continued firing up to 11.15 on Battery 3 as it
nced in column along the road—an aiming drill. Halt
on near Vuarrens; reached Orbe at 2.40 p. m. Rate of
hing, 2.6 miles per hour. Same officers that joined us
evening accompanied the battalion.

iday, February 5.—At 4 a. m. captains unexpectedly
ve orders to awaken their cannoneers and construct gun
acements at the Signal d'Orbe. The working party with
and lanterns reaches the position at 5 a. m.; by aid of
nap and lights perceivable in the distance, we select a
of fire toward Yverdon; ground is rocky; emplacements
ned at 6.45. Battalion starts out for practice firing at 8
; sick, 1 man, 1 horse. The dense fog which covers the
hides the targets until 11 a. m. While waiting, the em-
ements are revetted. Firing from 11 to 1 p. m.; 180
onel at five targets for each battery.

ternoon: Indoor work, thorough grooming of the horses,
service of the park complete; school of the soldier, and
ver practice.

turday, February 6.—From Orbe to Bière (21 miles).
Charrière de Sévery, commanding officer of the group to
h the battalion belongs, arrived this morning and
ected the battalion on the march. Heavy rain, cold,
violent wind; temperature + 6°. Reveille 5.30; sick, 3
es. Left at 8 o'clock for Arnex, La Sarraz; tactical exer-
with Battery 3 posted 9 miles north of Cuarnens, and
ery 4 to the east of Moiry; reached Bière barracks at 3
. Called on the inspector in a body at 4.30 p. m. Rate
arching, 3.4 miles per hour.

nday, February 7.—From Bière to Morges (11.5 miles).
eille 5.30; sick, 1 man, 2 horses; 1 man from sick to duty.
at 8 a. m., in a heavy shower; temperature +7°;
hed Morges at 10.50 and parked in the arsenal yard.

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Immediately turned in the carriages and harness. Rate of marching, 3.8 miles per hour.

Monday, February 8.—Reveille at 5.30; sick, 1 man, 4 horses. Demobilization; calks removed from the shoes. Damages to horses assessed and horses turned in; paid the owners their hire. Reports and notes completed. Medical theory of insurance and the military pension law.

Tuesday, February 9.—Reveille 5.30; sick, 1 man. Closing up of accounts of the trip; distribution of the surplus mess fund; address by battalion commander at 9.30 a. m.; disbandment and departure by detachments for the railroad station.

REMARKS.

THE PERSONNEL.

The personnel was noticeable for ardor, vigor, *esprit de corps*, and a fine appearance which was unanimously accorded to it by the daily newspapers. The season selected for the practice favored the farmer participants, while autumn maneuvers would have interfered with them; this was evidenced in the disappointment shown by those who were rejected as supernumerary on the first day of entry. The practice gave every man frequent opportunities for displaying his resources and humoring his "amour propre;" this latter condition or characteristic, which can not be appealed to too strongly, being the mainspring of action with the men of romantic Switzerland. The pleasure that consciousness of an obstacle overcome produces was strikingly shown at Mosses and Gessenay. Our soldiers exerted themselves to the utmost in performing what was new to them; they were bitterly disappointed in not being able to fire the moment they reached Thoune, and most of them disliked the necessity of remaining in the Thoune barracks two days longer than the programme prescribed.

CARRIAGES.

Our carriages are strong enough; only one pole and a caisson trail were broken on the trip; none was upset, notwithstanding the frequent tipping. During the Thoune firing a number of bolts came out, probably loosened by frost action; owing to the frost and icy surfaces, the drag shoes and especially the ropes of the Lemoine brakes adhered hardly at

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all to the peripheries and naves of the wheels; ropes of rectangular cross section were found equally useless. Some caissons were furnished for trial with ordinary brakes having handles flush with the top of the rear chests, and these, renovated from old ordnance stores, proved of great service. The grain sacks of the limbers kept the oats dry in rain or snow, but, once refilled, they are too short and the cannoneers are hurt by the sharp corners. On steep and long ascents, over soft ground, or through the snow, our pieces (weight 4,630 pounds) were too heavy for their six horses, and so much the more was this true of the caissons (which weighed 5,512 pounds) although six horses managed to draw them.

As to the carriages of the reserve:

(1) *The mess wagon with a limber* (*experimental*).—The limber contains horseshoes; it is therefore inseparable from the battery wagon. The rear carriage is an ordinary mess wagon, changed in some details, and with the shafts replaced by a trail for limbering purposes.

(2) *The battery wagon* (*experimental*).—This is a bridge cart (*char à pont*) carrying portable tool chests for the working parties, three spare wheels, three spare poles, and a portable forge; the mobility of the chests makes the working parties independent of the wagon, and the caissons are not burdened with the spare parts. The wagon wheels are too low and their fellies too narrow; they sink into soft ground and increase the resistance.

(3) *The battery forge*, very much too heavy, is not suitable for a mountainous country.

(4) *The infantry baggage wagon, new model*, differs from the present one in the absence of the basket work (*la corbeille*); the wagon bed is lower and wrought-iron hoops are used to support the wagon cover. The wheels are too small.

(5) It has been observed that the depth of snow at Mosses made it necessary to place the mess wagon on a requisitioned sled; otherwise the bottoms of suspended pots dragged in the snow.

No carriage of the battery reserves, at times even on level ground, could be drawn by the regulation number of horses; the teams had to be constantly reenforced, or the carriage loads lightened by making use of the requisitioned sleds. On snow-covered roads, with a beaten track midway only, tandem driving with the rear horse at the end of the pole proved the best. With two horses at the end of the pole, one of them was

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either buried in the snow or became exhausted and had to be dragged along; one horse at the pole end is therefore preferable.

It was observed that on account of the violent oscillations of the pole in passing over ruts, it is dangerous to employ cannoneers to keep the pole in the proper direction; it would be better to replace it by shafts with the customary one horse attached. Unlimbering the carriages and dragging the rear parts separately or with prolonge is hardly practicable or advisable; it occasions too much delay, and it was found very difficult to guide the rear part, as it followed the ruts or slid either way from the higher parts of the road. Doubling of teams on a narrow road is difficult; causes delay and impractical curved lines of traction; it is desirable to have this included in drills.

In snow, and especially the first day near Mosses, an interesting experiment was made with sled runners—a kind of sleigh shoes or skates of hard wood that were attached to all the wheels of a carriage or to certain pairs of wheels. These runners, shown in fig. 43, were about 40 inches long and 4¾ inches wide; a groove received the felly, to which the runner was fastened by rope or iron straps; the wheels were prevented from turning by the wooden crosspiece *A*, which, resting upon the footboard or carriage, projected between the spokes of opposite wheels. As has been observed in the "Diary of Events," these runners did not give good results. It is true that the condition of the roads was unfavorable to their employment; the snow was too deep, fine, and unbeaten on the roadway to sustain the carriages, and its very fine consistence and the low temperature prevented it from packing. Not wishing to prejudge the results of new experiments, it may be stated that, under existing conditions, the breadth and especially the length of the runners used were altogether insufficient; the part *a c* being only about 2 feet in length, the surface of contact with the roadway was entirely too small for a weight of from 1,150 to 1,370 pounds per wheel.

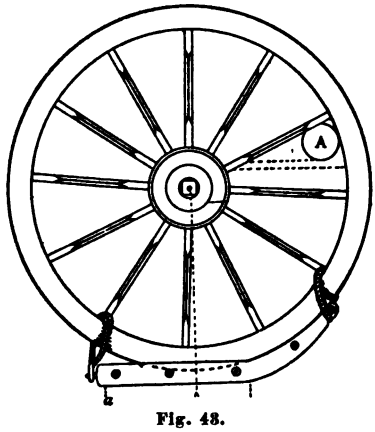

Fig. 43.

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—Piece, with Runners under all the Wheels, between Sépey and Comballaz; Difficult Hauling, notwithstanding little snow, gentle ascent, and reenforced teams.

Fig. 45.—Battery Forge with Sled under the Body.

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With regard to the pointed runner, which should be turned up in front, it appears necessary to have the part *a c* (fig. 46) at least 40 to 44 inches long; the total length *a d*—the maximum length depending upon the width between wheels, if the runners when unattached are to be carried on the foot-boards—should be as great as possible. To facilitate sliding over the snow, it would perhaps be advisable to put metal shoes on the runners. Care should be taken to have the resultant weight pass through *b*, nearer *a* than *c*, so that the runner will maintain its best position for travel on the snow.

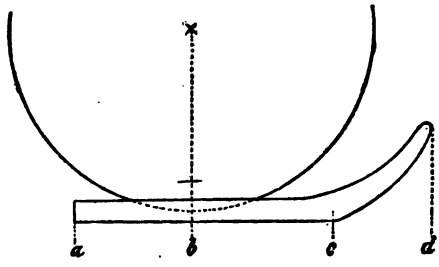

Fig. 46.

After all, the runners tried by the battalion, and which are very much like those prepared in 1888 by the Austrian General von Eschenbacher (see *Revue d' Artillerie*, August, 1891, Vol. XXXVIII, p. 484) are only suited to well-beaten snow with a firm and fairly smooth crust.

The second day at Mosses a sled was placed under the body of the forge of Battery 4 (see fig. 45), and this experiment was successful; with the forge on wheels its six horses were exhausted in dragging it, whereas, with the aid of a sled as above described, but two horses were needed to move it easily at a trot from Etivaz to Château-d'Œx. The runners shown in fig. 44 have exactly the shape given in fig. 46. Experiments in sled transportation of artillery carriages had already been made in Galicia by Major von Meyer (see *Revue d'Artillerie*, February, 1888, Vol. XXXI, p. 471); the carriage limbered was placed on bobsleds, a bob under each part; six horses could draw it under ordinary circumstances; loading the carriage on sleds required six minutes and unloading five minutes. Besides affording ease of traction, this mode of transportation has the following advantages: The width of track required is reduced to that of the sled runners, and compared with the use of a sled the center of gravity of the

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ge is lowered, thus lessening the liability to overturn. lisadvantages are that if on a sled the piece is not ready ring (which is not the case if runners only are used), and sled material would make cumbersome loads in a thaw.

HARNESSING.

e harness proved remarkably strong; no traces were en, although at times a single pair was subject to the f eight horses. The noncommissioned officers and trum- s' horses were useful in the teams; to attach them, the traces and collars were utilized in preference to the t straps, which invariably injured the horse however the exertion.

AMMUNITION AND FIRING.

ch battery fired 240 shell and 330 shrapnel; 270 shrapnel, n to furnish the chests completely, were turned in at the of the exercises.

e new system of fuse adjustment (*tempage*) was quickly ed by the gunners and marked a step in advance. In of considerable depth a large number of shell did not ; the snow prevented the spread and ricochet of shell nents and shrapnel bullets to such a degree that their was reduced to a minimum. The targets at Thoune on a white ground, the graze or point of fall at the very ranges could rarely be observed; it was judged as a rule an unobserved graze was short of the target, and the was regulated, not by bracketing, but by increasing evation. In spite of the difficulties of observation and nting, caused by heavy snow falls and driving wind, the nd bursts were good; but few rounds were fired, how- for the reasons above given.

Orbe, the firing was rapid and the results satisfactory, ugh the targets were hardly visible and the angle of fall derable.

e utility of gun emplacements with an embankment is ful, especially in rocky ground like that at Orbe; they l no substantial protection, and the enemy's projectiles, ng the embankment or parapet, scatter the stones like fragments. The parapets, even if sodded or covered branches of trees, disclose the position and make an lent target for the enemy. For these reasons, and to

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save time, it would be better to cut narrow trenches for the wheels and wider ones for the cannoneers, in which they may either stand or kneel.

HORSES.

When received, the horses (all of which, except those used by the officers, were hired) appeared of inferior quality; their appraised value averaged $140 ($145 for this battalion in the 1895 maneuvers). However, these horses proved equal to the task, often very severe. The first day at Mosses they refused to enter the deep snow, and showed themselves very inferior to the requisitioned horses raised in the mountain districts which plunge fearlessly into snow halfway up their breasts. Considering the route and excess in weight of the carriages an effective of 106 horses per battery was insufficient; even presuming that the carriages of the reserve might be drawn by the regulation number, there would remain for each battery but four spare horses. On difficult parts of the road the necessity for simultaneous effort on the part of all the horses attached to a carriage was shown in a striking manner; the least unskillfulness of the drivers of a carriage in this respect resulted in jerky movements and delays, measured by hours and affected the entire column; nothing is gained by whipping horses of a team disunited or out of breath. Some horses pulled best with their drivers mounted, while with others it was found better for the drivers to dismount and, dropping the reins, threaten them with the whip; in the latter case the lead driver marched a short distance ahead of his horse leading it by the reins.

SHOEING.

The removal of shoes from 200 horses and reshoeing them cold, with ordnance shoes was performed by fifteen farriers in 14½ hours—about 217 hours for one man, and an average of 1 hour and 10 minutes per horse. In a working day of 10 hours the two farriers of a battery would therefore shoe hardly 20 horses per day, and it would take eight days for them to shoe the 160 horses of a battery. If, then, in case of a winter mobilization the horses must be furnished with ordnance shoes at the outset, it is necessary, in time of peace, to establish shoeing stations, with civilian farriers designated and instructed to this effect. In case of a call for active service, the communes should be ordered to have the horses supplied by them shod by these farriers.

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Night horseshoeing by the aid of Wells lamps was not suc-
sful; the humming noise of the lamps frightened the
rses, and the light was too intermittent to permit of care-
work. Owing to the lack of suitable sizes, some of the
rses with either very large or very small feet received shoes
ich did not fit them.

During the trip ninety-four shoes were replaced, only about
per cent; faulty shoeing caused fifteen cases of lameness,
t of much importance since all the lame horses, except one,
ved uninterruptedly.

Each mounted man was furnished with a canvas case con-
ning calks and a hammer. The calk, of steel, and in the
m of a square pyramid, had a shank slightly conical and
ncated; two calks were attached to each shoe by driving
em into polished cavities near the heels. The hammer
ench is too light; the hoof pick at the end is too blunt, and
thout an edge to clean the cavity thoroughly; if a stone
ects a lodgment, the soldier might better use the curved
de of his military knife. The calk is held securely only
en the cavity is carefully cleaned; the adhering oil, or
ease, used in the arsenals to avoid rust, prevents firm
ntact.

The calks were attached by the men at Rennaz in twenty
nutes for the entire battalion; none was replaced on leav-
Moudon, nor until we reached Morges. In this operation
men would advantageously hold up the horse's feet and
t the outer edge of the shoe against some hard substance,
h as a stone. Removing the calks at a halting place is
practicable, but it would make kicking injuries less dan-
ous and permit the horses to rest better. The number of
ks lost (especially large as it was in soft ground) averaged
ee per day, which could be lessened by attaching them
re carefully and using a better hammer. Some drivers
not lose a single calk of the sixteen attached to their teams
ring the entire trip; while in other cases, the calks fell out
er the first few steps, which was apparently due to deforma-
n of the cavities in shoeing. Even after a march of 205
es, in half of which the road was denuded of snow, the
ar of the calks was hardly appreciable.

Winter shoeing of this kind, with heel calks only, sufficed
saddle horses, and for draft horses on descents; but not
the latter on flat or rising ground if covered with ice or a

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thin layer of fine snow; the horses do not fall, but slip with every tractive effort. In order to compare results, it would be interesting to try the French, or Delperrier "stud," and the German screw calk, H brand.

CLOTHING.

On entering for this service, each man drew a *ventriere* and a pair of gloves. The former, of brown wool, knitted, is like bathing tights without legs; it rendered fine service in preventing affections of the digestive organs, as well as lumbago, to which the men were particularly disposed on account of alternating violent exertion and compulsory rests in the cold and rain. The gloves, of black cloth such as the infantry wear, prevented frostbites even in the coldest weather; as only the right-hand glove had fingers, the drivers had to wear it on their left hand. The officers were well protected from frost by knitted, ribbed gloves of coarse white wool. The cannoneers, only, drew leggings to be turned in on the return; they would have been quite useful for the drivers, who often had to march in the snow, and, when mounted, suffered with cold feet; they could have been worn under their leather leg guards.

Few ordnance shoes were purchased by the men, who brought large and strong ones with them from their homes. The officers finally adopted for very cold days the same cloth leggings that the troops used; they kept the feet dry and warm and supported the ankle; leather trousers legs and boots, although high and large, were much colder.

Flannel bandages, such as are worn in the French Alps, did not protect the feet against cold or the penetration of snow; they have the advantage, however, of being easily dried and packed. The officers were satisfied with their iron-shod shoes without spurs. It is useless to cover the stirrups with sheepskin, flannel, or straw.

The cloak was worn nearly every day. The loose blouse (or jumper) and plain cotton shirt would be insufficient protection against the cold, especially through a long winter rain; consequently most of the men had a flannel or knit woolen shirt, woolen drawers, and socks or slippers. The rustics wore thick cotton suits. As it is not certain that all the men required have the means for bringing with them this indispensable underwear, the Confederation should furnish it

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inter service gratuitously or at a reduced price. Every had a blanket; the cannoneers' blankets were rolled on knapsacks, and the others on the saddles of the off s.

e officers, authorized to wear the blue cloth cape, found ry useful, except in a heavy rain of long duration; in ing weather, a cape doubled replaces a cloak perfectly; es, it has the advantage of protecting the hands from cold noisture, of not interfering with freedom of movement, of being quickly dried, rolled, and packed; when worn the cloak in the rain, it is a useful addition.

SUBSISTENCE.

though isolated, the battalion had no quartermaster—the tant, assisted by a capable enlisted man, performed the

ead and meat were obtained along the route, in the ity of our halting places—arrangements for this purpose ng been made several days beforehand, in each case, by spondence. Cash payments were made to the communes ay and straw; it was seldom we could obtain these articles, e bread, at the price noted by the subsistence department; ifficulties attending snow transportation raised the mar- alue enormously. Oats were supplied by the Confedera- except 2½ rations bought under urgent circumstances.

ree rations of canned articles—meat, soup, and biscuit- d—were used; the first two were good, as usual. A it-bread, about ¾ by 4 by 5 inches in size, five in a box, he consistence, color, and taste of "zwieback;" it is very n superior to the old biscuit, and was much liked. The meals were as follows: First, in the morning, Kohler's lent chocolate; second, on the arrival of the mess wagon e halting place (between 3 and 6 p. m.), soup and meat; , in the evening (7 or 8 p. m.), soup again. On the h the men ate sausage, cheese, etc., bought by them or lied by the mess. The increase to 22 centimes of the allowance for salt and vegetables enabled the captains ovide certain extras, such as grog, hot or cold coffee, these judicious expenditures are certainly preferable to ibuting a large mess fund, which would be far from table to the men. No extraordinary issue was made to nen.

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TRANSPORTATION.

The application of the administrative regulation to communal (or parish) transportation is not without fault. This rule, in effect, establishes two fixed tariffs—first, the kilometric tariff (art. 260), for transportation from one halting place to the next one, allows an indemnity of 15, 25, and either 5 or 10 centimes per kilometer for driver, horse, and vehicle, respectively, with no payment for return trip; second, the time tariff (art. 261), applicable to short-distance maneuvers, fixes the indemnity at 1 franc for a one-horse vehicle and 1½ francs for one with two horses. Evidently the first of these tariffs had to be used by the battalion, as its halting place at night was different from that of the night before. Now, it is not just to remunerate the commune according to kilometers traveled as if the road were free from obstacles, when, in fact, the advance or the return trip, for which no indemnity is allowed, is considerably retarded and often stopped for hours by the column of military vehicles. It is equally unjust to take no account of the season, condition of the roads, temperature, etc., and to pay drivers, horses, and carriages for so many kilometers the same indemnity for summer transportation in fine weather, daylight, or over smooth and open roads, as for a trip over bad mountain roads, through 40 inches of snow, with the temperature at −20° C., and sometimes by night, or with the obstructions incident to a long column of military vehicles or troops. There should be established for these conditions a time tariff, taking into consideration the special difficulties of transport and providing an indemnity for the return trip. The present kilometric tariff, quite low if easy transportation is considered, or is desirable, becomes altogether oppressive to communes required to provide transportation over difficult roads. They are obliged to pay a reasonable amount to the carters they employ, and to bear themselves the difference between this amount and the tariff allowance. For the mountain communes, which would often be subjected to requisition, there is here just cause for discontent, which might make the troops unwelcome and affect the quality of the other communal supplies, such as food.

In difficult country the need of a vehicle, or of a reenforcement, arises so unforeseen and urgently that in applying to the commune it is often impossible to adhere to the regulations.

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If, during a march and unexpectedly, there is need, *e. g.*, of sleds to assist the reserves, it would be silly to lose hours, perhaps, in hunting up the communal authorities. Resort is had to the nearest peasants, and to persuade them to furnish their material, they are given to understand that they will be well paid. When the regulation is applied, the scene changes. In order not to be held responsible for any excess, the inadequate tariff already described must be adhered to. Perhaps the risk is run of forcing the kilometrage, or applying the time tariff, but, in spite of these arrangements and after nice discussion, the contractor retires justly discontented. There ought to be an official recognition of the right of responsible parties, in urgent cases, to deal directly with those who furnish transportation and of compensating them by the day or according to a remunerative tariff, due regard being paid to circumstances.

QUARTERS.

The troops were usually cantoned; at Morges, Thoune, Fribourg, and Bière, they were put in barracks; and, at Orbe, billeted among the inhabitants. Arranged for several hours beforehand by two officers, the sergeants and quartermaster sergeants, the quarters could be occupied immediately on arrival. As a precautionary measure some cantonments were prepared at various intermediate points which we were not sure of being able to pass beyond in the evening.

SYSTEM OF MARCHING.

It was found well to unite the reserves of the two batteries under the command of an officer, who should be selected from those most experienced, because it is primarily the reserves that meet unexpected obstacles, for they are detached from the moment of departure and their carriages proceed at a gait most favorable to them.

The omission of the long halt at noon was productive of good results; it enabled us to complete our day's march before dark, to select the cantonment with care, to groom the horses thoroughly, to perform the park duties well and the routine drills (school of the soldier and firing), and thus get the troops again in hand. The horses were in perfect condition under this system; eating little in the morning and a good deal in the evening, their hay was easily digested, it was better assimilated, and the following day they were in fine condition for

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the march. Long halts in the middle of the day have generally proved inconvenient to the maintenance of discipline and the health of men and horses.

During the march there was the least possible drawing of the saber and of marching in review order in passing through public places, to the great disappointment of certain persons to whom the word "military" is synonymous with display.

Trots were infrequent, but prolonged (twenty to thirty-five minutes); there was no hesitation in keeping up the trot on ascents not too long or too steep, or over soft ground with quite a sharp descent; no horse interfered or fell during the trot. The trot by sections proved to be very practical. The distance traveled in thirteen days being 205 miles, the mean daily march was 15¾ miles. The mean rate per hour was about 2½ miles, hourly halts and the days spent at Mosses and Gessenay included; the highest mean rate for a day was 3.7 miles (Bière-Morges), and the lowest, 0.43 mile, (Sépey-Mosses). Mean daily number of hours employed, counting from time of pulling out to arrival at halting place, 7⅓ (maximum 12.)

INSTRUCTION.

The battalion dispensed with instructors; officers not belonging to the battalion, who were present during certain parts of the trip, were there only as inspectors or spectators; the care of the battalion and the responsibility for the orders to be given, were left strictly to the battalion commander.

Besides firing under service conditions and tactical exercises, the troops were drilled for their instruction and the maintenance of discipline, in the schools of the soldier, piece and firing. Every day a certain number of officers had to perform staff duties, such as preparing orders for the assembly or movements of troops, reports of the reconnoissances of roads, of engagements, cantonments (with sketches), march diagrams, profiles of roads, etc.

As the trumpeters' instruments were generally frozen when the temperature fell below −3°, they used their horses to reenforce the teams, or were useful as messengers for the scouts; as heretofore, they proved the least useful when attached to sections.

DISCIPLINE.

The interest taken by all the men in having the course successful made the discipline excellent; here also it was observable that an appeal to their "amour propre" was more effective

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with the men than punishment, which would be difficult to administer properly during a continuous march.

Notwithstanding an almost daily change of cantonments, very few articles of equipment (whistles, whips, blankets, bags) were lost; this good result was due to the custom of having a mounted noncommissioned officer visit the cantonments immediately after the troops left.

SANITARY CONDITION.

First. Of the men.—The sanitary condition of the men was certainly better than would have been expected; this was due in part to precautions taken by the officers in regard to their men and to the unusual care which the men themselves had of their health. The total number of days of sickness was 21, an average of 1 sick man per day, out of 283 men; this shows an ineffective of only 3.5 to 1,000 effective men, about the daily average of the sick. In the course of artillery instruction throughout Switzerland, this ineffective is 0.008; and for the entire population of the country, aged 24 years (the average age of men designated for this course), it is 0.015, about double the ordinary military ineffective and four times that of our battalion in its winter march.

There was but one accidental injury during the whole course—one of the cooks cut his foot with a hatchet while splitting wood. Of the five men sent to the hospital, four were under treatment the day of disbandment and the fifth was returned to duty. Among the cases there were only six wounds (these include foot chafes) and nine of chills; this is certainly remarkable considering the time of year as well as the continuity and length of the march. Frost or snow is much less disagreeable than rain; the latter, especially if it continues for several days, as was the case, penetrates to the skin and evidently depresses the men both physically and mentally. There was no case of freezing, even local.

Second. Of the horses.—Owing to their lack of animation, very many of the horses were greatly fatigued by their first day's march. The cold and hard work at Mosses evidently affected them, making them cross.

Their internal maladies were five cases of colic, immediately cured and not unfitting them for service; two of acute bronchitis, one case sent to the hospital; about twenty cases of cough without other complications. The fact of the horses

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being of rather quiet temperament and but little overheated contributed to the rarity of acute affections.

The external maladies were eleven kicks, five sent to the hospital—the shoe calks made the cuts resulting from these kicks particularly deep; forty-nine interferences, between Aigle and Zweisimmen; thenceforward this was not renewed as the horses appeared to get accustomed to their new kind of shoes. Of five sore withers, four were still under treatment at the close of the course; owing to the cold weather, a sufficient number of "false collars," and the absence of dust, other harness injuries were few and quickly cured. Contrary to all expectation, and thanks to the precaution taken to grease the pastern fold every second day, there were but six cases of cracked hoofs, which produced neither lameness nor assessment for damages at the end of the trip.

Total number of days of sickness, twenty; this represents an ineffective (the mean daily number of horses sick per 1,000 effective horses) of 4.3. For the entire course on the Place de Thoune in 1888 (school of recruits and indoor exercises included) the ineffective reached 4.6 per thousand. The sanitary condition of the horses of our battalion during its recent winter march was therefore very remarkable; the ineffective of the regiment in the 1895 maneuvers was 8.8 per thousand.

The number of horses depreciated per 100 effective horses was 51 (in 1895, same regiment, 48 per cent); average depreciation per horse of the effective, 15 francs; and per horse depreciated, 29 francs (in 1895, 11 and 22 francs). As seen the depreciations resulting from this winter march exceeded very little those of the regiment in the 1895 maneuvers. Now the results of 1895, with 2,085 francs depreciations for the entire regiment, were appreciably more favorable than the average of our course, which per regiment would be 3,000 francs; but a regiment of artillery can be named which, as a result of the autumn maneuvers of 1896, had 4,215 francs depreciations (23 francs per horse of the effective).

CONCLUSION.

Everyone can draw from the facts above given such conclusions as may be warranted. It is enough for us to state that the winter march of this battalion has furnished, in regard to the conditions of employment and management of our field batteries under difficult circumstances, valuable information which a practical trial only could give. For this

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reason, congratulations are in order on the fact that our military authorities did not recoil before the criticism made in advance, and at times somewhat harsh, to which the project of a winter march of our artillery in high altitudes had given rise.

The results obtained may be considered good; let us hope that, profiting by the experience of our battalion, other battalions may obtain under similar conditions even better results.

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THE NEW GERMAN GUN.

By Captain MARIN.

Translated from the French

By Capt. J. J. BRERETON, Twenty-fourth U. S. Infantry.

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THE NEW GERMAN GUN.

I.

.German army was provided with a new fieldpiece two
ns ago.*

s news was given to Europe by a semiofficial Berlin
, the *Unteroffizier Zeitung*, which mentioned the distri-
n of the new gun to the first regiment of field artillery
guard, the sixth regiment of field artillery, in garrison
eslau, and various other artillery regiments beyond the
es. It therefore appears certain that the new cannon
een placed in service, in spite of the very modest medium
gh which such important information was announced.
same paper also gives some technical details concern-
ne new gun. It informs us that the new machine, to
the designation "C. 97" has been given in the ord-
nomenclature, is an entirely new model, and that it is
wise an improvement grafted upon models "C. 73,"
8," and "C. 91," which were successively adopted in the
an artillery in the years indicated by their designations.
s statement is, moreover, corroborated in the most con-
e manner by the following remark uttered by the same
al: "Externally the surprising features are the great
n of the new gun and the change in the caliber, which
ch less than in the old gun, 75 millimeters instead of 88."
s reduction in caliber, by which the editor of the *Unter-
r Zeitung* was struck, is really characteristic of a com-
revolution in German artillery matériel. Not only is
un new, but an entire renewal of field projectiles is
ed in the present alteration. This great reduction of
llimeters in caliber was evidently a concession to the
ans of the lightening of the field artillery; and the con-
n is so much in line with the advantages that the new
attaches to rapidity of fire that the new gun may be
d naturally among those which for some years the pub-
s been accustomed to hear referred to as "rapid firing."

*Capt. Marin's article is dated about July 1, 1897.

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The news thus retailed should not be dismissed without some retrospective remarks upon the financial procedure by which the German war department was able to accomplish the manufacture of this new machine.

In 1892 the German Parliament had voted to the extraordinary budget an appropriation of 158,000,000 marks "to complete the field batteries;" and astonishment was awakened abroad by the disproportion between this great sum, in round numbers 200,000,000 francs, and the modesty of its object.

A *lapsus* was taken for granted, or at the least a voluntary equivocation; for it is not in the military budget of Germany that an appropriation of 100,000,000 could decently go astray. This, in fact, was the case. The 158,000,000 marks of 1892 were simply devoted to the manufacture of the new gun of 75 millimeters and its projectiles.

The vote of these 158,000,000 marks gives also the age of this new machine, which will eventually serve the Emperor of Germany as a final argument, after diplomacy shall have yielded the floor to him. Its conception dates back to the year 1892. Hence it is now five years old. The little German gun of 75 millimeters is therefore already well behind the times, for the ideas which prevailed at its conception in 1892 are to-day entirely out of style; and it has been unanimously acknowledged since that period, that they contain nothing practical. This does not say that the fanatics of those ideas have not warmly defended them, in France as well as in Germany; and but little was needed to make them as successful on this side of the Vosges as, from what the *Unteroffizier Zeitung* tells us, they have been in Germany.

Happily a young artilleryman was found in France, versed in the technical problems of his art, and gifted, as well, with a remarkable talent for demonstration. He made his comrades listen to reason, and prevented the minister of war from giving legislative encouragement to the propositions of inventors, whose design was to reorganize our field artillery matériel by the adoption of a cannon of the same caliber as that which, according to the above-named paper, was distributed in the month of May, 1897, to the German artillery regiments.

Captain Moch, in his "General view of the present artillery," a memorandum written for the international congress of engineers held at the Chicago Exposition, devoted to the fanatics of the "rapid-fire gun" a peremptory refutation of

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laims which they advanced concerning the practical
e of their idea.

e Captain's conclusion left nothing to be desired in the
of precision: "Were we to accept the already widely
ded designation 'rapid-firing gun,'" wrote the Captain,
would appear that a progress comparable to that which
ed the adoption of repeating rifles had already been
ned. The matter is very far from being so advanced.
nventors are playing a part in exaggerating the qualities
eir matériel, and the public is naturally taken in by high-
ding phrases. But it is also our duty to forestall prema-
impulses of opinion by declaring that there is not as yet
uine field gun worthy of being substituted for the pieces
in use."

ptain Moch's assertion, and the witty as well as authentic
onstration accompanying it, in his "General view of the
nt artillery," opened the eyes of our minister of war to
eril in which our artillery would have been placed by the
tion of one of the numerous playthings which the invent-
trove to represent as "true field guns."

yond some polygonal trials, nothing was attempted, and,
ite of the selfish plaints of the metallurgists who believe
"when steel goes, all goes," the scheme to appropriate
00,000 francs for the reorganization of our field artillery
riel did not receive the signatures of the ministers of war
inance, who would have brought it before Parliament.

II.

hat is the defect in the various 75-millimeter guns that
been constructed in the French, English, and German
ries during the past five years?

e defect is the same in all; it springs directly from the
amental idea of these various guns; it is condensed in
phorism: "It is impossible to make a true field gun of
aliber of 75 millimeters."

e ground for this aphorism is that the 75-millimeter shell
ot be "a good projectile" for ranges beyond 3 kilometers.
hat is needed, then, to insure accuracy of fire in action at
es beyond 3 kilometers?

must first be carefully noted whether the shell falls short
e object fired at or beyond it. If the cloud of smoke
uced by the shell is not sufficiently compact to be clearly

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distinguished by the captain in relation to the various silhouettes of the battlefield, there is no "observation," in the precise sense in which this word is used in the practice of regulating fire; hence there is not a "good shot."

The inventors of rapid-firing guns have generally lost sight of this technical detail. Most of them have taken, as a measure of the merit of a field gun, the number of hits made in a given space of time, five minutes for example, in one or two lines of planks representing an infantry or cavalry formation.

Such of these inventors, as have looked beyond this battered definition of a "good field shot," have treated only superficially the problem of observation of fire at ranges beyond 3 kilometers. For example, one of the latest comers, the inventor of the rapid-firing 75-millimeter gun, "Canet model 1896," has added the following note to those describing the different elements of the matériel of his invention: "The cloud of smoke disengaged at the moment of explosion is visible up to 4,500 meters." The inventor believed that he had said enough in making this assertion. If, however, he wished to write something scientific, he should have described the kind of light by which the cloud of smoke referred to had been observed.

We know that in photography the actinic effect of light is a prime factor in the length of exposure. Treatises upon this art teach, for instance, that in the month of January the exposure should be, on the average, fourteen times as long as in the month of June, if the operator wishes to obtain an equally good picture of the subject.

Clearness of the atmosphere plays an analogous part in the "visibility of the cloud of smoke disengaged at the moment of explosion of shrapnel," a visibility that is, in brief, but the impression produced upon the retina by this cloud under conditions analogous to those which the same cloud would produce on a photographic plate were it substituted for the eye of the observer. The clearness of the atmosphere varies besides, every day, from dawn till evening twilight, passing through maxima and minima, varying in positive value from 1 to 4. The hygrometric condition of the air in the first place, and, after that, the screen of clouds above the objective and the observer, exercise an important influence upon the positive value of these maxima and minima.

Thus the assertion as to the smoke produced by the Canet shrapnel at 4,500 meters from the observer should, to support

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ave stated definitely the circumstances of the day, hour, place, and of the atmospheric light, at the exact moment servation,

ll more data would be necessary to give the weight to this tion that its author intended by his brief and ingenuous uncement.

r this announcement is silent as to the optometric* coef- t of the observer, who distinguished the smoke cloud he Canet shrapnel at 4,500 meters; and this coefficient s greatly for the same observer.

mparison has been made, not without reason, of the dif- ces presented by this coefficient in individuals, with the rences in sensitiveness which characterize the various s used in photography.

om these simple remarks, we must take into account the tial importance presented by the detail of atmospheric , at the instant of the bursting of the shell, as well as of the degree of acuteness of vision of the observer who nguished the smoke cloud disengaged at that instant.

the absence of information as to these details, the ical reader of the lines: "The smoke cloud disengaged e instant of explosion is visible up to 4,500 meters," is per- tempted to consider the clearness of the atmosphere as rage" for the place and time of the explosion of the onel. He is equally compelled to consider the acuteness e observer's vision as "average" with reference to that fairly numerous group of observers who might have assembled in the field of fire.

it necessary to point out here to what extent this double rage" is liable to equivocation or contradiction? Besides, is nothing scientific in it; with reference to it, we ld be strongly tempted to repeat, as Captain Moch already remarked, that the inventors of rapid-firing are playing a part, by exaggerating the qualities of matériel, and deluding the public by high-sounding ses.

uivocation! Cursed equivocation! How largely you e in our errors, even in those which most affect our ary condition!

e can then properly, without further discussion, disre- this idea of "average," as well for the conditions of

*Pertaining to the measure of the limits of vision.

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light in the polygon as for the conditions of acuteness of vision in the observer. Such an average would really be too liable to suspicion as lacking in sincerity and frankness.

One deduction that we are entitled to make from the assertion as to the cloud of explosion produced at 4,500 meters by the Canet shrapnel of the 1896 model is that in very clear weather an observer gifted with excellent sight was able to distinguish it.

This is something, undoubtedly; it is even very remarkable, considering the small volume of the 75-millimeter shrapnel and the small quantity of powder that it can contain, but it is not visibility, as Dumanet understands it, or as it would be usefully applied upon the field of battle with reference to the falling "short" or "beyond," upon which depends the regulation of fire, without which the shots do not tell.

The present 90 shrapnel is greatly superior in this respect to the 75 "Canet model" shrapnel, as well as to every other of the same caliber, whether it be called "Darmancier model," "Piffard model," or "C, 1897." Even by greatly increasing the length of the narrow case, which composes the framework of a shrapnel of 75 millimeters, it could only be made to contain (1) a quantity of powder too small to make its cloud of explosion easily perceptible, and (2) a number of bullets too small to produce any serious effect.

Imagine two bottles of champagne of the same diameters, respectively, as the two shrapnels of 75 and 90 and of the same thickness. You notice immediately how limited the capacity of the former is in comparison with the latter, in spite of the proximity of the two numbers which indicate their external diameter—their caliber. The numbers 55 and 70 are the ones that really correspond to the respective diameters of the two bottles; this follows from the respective capacities of the two cases, 332 and 686 cubic centimeters.

To sum up, the interior capacity of the 75 shell is, in round numbers, half that of the 90 shell; it is only a pint bottle. It is the "yield" of the shrapnel, not only with respect to the visibility of its cloud of explosion, but also with respect to the number of bullets which measure the deadly effect of shrapnel against ranks of men and horses.

In addition to the envelope of the shrapnel, which has already been compared to a bottle of champagne, there are various parts which are necessary to the composition of the

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shrapnel, and which, nevertheless, are practically dead weight so far as the "yield" of the shrapnel on the battlefield is concerned.

Extending our figure of speech, we may, in the first place, compare the combination fuse of the shrapnel to the cork of the champagne bottle. Then we have the shell which serves as a special envelope for the charge of powder which is to produce the cloud of explosion.

It is not easy to find for this shell an element of comparison in the bottle which we have so far taken to represent the shrapnel, and we see, even from this fact, that the comparison of the small shrapnel with the large one becomes still more disadvantageous to the former than that of the pint bottle with the quart. The 75 shrapnel is not even half of the 90.

Captain Moch, in his "General view of the present artillery," carefully studied the dead weight of the small-caliber shrapnel; he proved that its total amount was as much as 1,700 grams, no matter how reduced the caliber might be.

This demonstration goes to show that one-third of the weight of the 75 shrapnel is dead weight, while only one-fifth of the weight of the 90 shrapnel falls under that head. Experience has, in fact, established that the 75 shrapnel can not weigh much more than 5 kilograms, say three times the minimum dead weight. On the other hand, the present 90 shrapnel weighs more than 8½ kilograms, or about 5 times this dead weight.

From this comparison an interesting conclusion is drawn in relation to the "yield" of the 75 and 90 shrapnels.

For a given weight of each carried on the caissons, let us say 1,500 kilograms, only a two-thirds part of the former, or about 1,000 kilograms is really utilized, as against four-fifths or about 1,200 kilograms of the latter.

This consideration is of some importance; to overlook it would give occasion for regret.

III.

It has already been noted that at ranges above 3 kilometers, for example 4½ kilometers, the 90 gun would crush the 75 gun, without itself having any reprisal to fear from the latter, the fire of which would not be subject to regulation.

This superiority of the 90 gun, peculiar to long ranges, would be of enormous value in the preliminaries of a

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struggle, that is to say, up to the moment when, the enemy's artillery having been riddled by shrapnel, it would become, for the gun, a question of breaking and decimating his infantry.

This second period of the fight will require the gun to draw nearer to its objective by a leap of say 1,500 meters, and this, by virtue of the hypothesis heretofore adopted, will bring the gun to about 3 kilometers from its new objective.

During this second period, the superiority of the 90 gun in shattering the ranks of the enemy's infantry will be due primarily to the greater ease of regulating its fire, for under many circumstances, even at ranges less than 3 kilometers, the cloud of explosion of the 90 shrapnel is clearly perceptible, while that of the 75 shrapnel is not; and, in the second place, it will be due to the fact that, out of 1,500 kilograms of metal discharged at the enemy, 1,200 will be useful ammunition, or about 200 more than with the 75 shrapnel.

It will be the same during the third period of the fight, in which, the opposing infantry being broken and decimated, the time arrives to prepare to assault; and, for that purpose, to carry the gun to such a short distance from that infantry that it may suffer the enormous losses it merits, leaving it, weakened, to the mercy of the bayonets of the infantry which will rush upon it.

In this third phase of the combat, which, to make the demonstration plainer, may be also characterized as a second leap of 1,500 meters by the attacking artillery, the 90 gun will undoubtedly have still more marked superiority over the 75 gun with respect to the regulation of fire, although in that connection certain atmospheric conditions may have to be discounted, under which a person could see no better at 1,500 meters away than he could ordinarily at 4,500 meters; but there will remain to a high degree the superiority of "yield," which will itself be all the more evident, because at these short ranges in the vicinity of 1,500 meters, 200 kilograms of ammunition give four and ten times the deadly effect that would be obtained with the same weight of ammunition, respectively, at 3 and 4½ kilometers.

This brief analysis enables us to appreciate the two principal causes of the superiority of the 90 gun over the 75 gun, in the three phases into which it is allowable to divide the battle.

Not a word has been said in this analysis of the advantage that a 75 gun would derive from its mobility in the first place,

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and in the second place from its rapidity of fire; and for this reason: If the 75 and 90 guns were to be associated in the artillery parks of future wars it would be permissible to allot their respective rôles. Success in the initial phase of the fight would in the first place be determined by the latter gun and later, in the second phase, would be assured by it; while the 75 gun, after having itself contributed to the success of the second phase of the struggle, would take the increased gaits in order to quickly decide the success of the third phase of the fight, thanks to its lightness and rapidity of fire. In a word, under this hypothesis, the larger gun would fight chiefly at long distance and the smaller at close range.

In reality, such a hypothesis is inadmissible. To have two calibers, 90 and 75, in the field parks, is to complicate the service of the artillery. Every serious mind would reject this complication.

Under these conditions, in order to nullify the advantages of the 75 gun resulting from its mobility and rapidity of fire, it is sufficient to show that this gun will be placed *hors de combat* at long ranges by the 90 gun, as was the "4" French gun, proud of its four horses, by the heavy German cannon during the hostilities of August, 1870. The light weight of the "4" French shell was really the principal cause of its inferiority to the German shell, without regard to any consideration of muzzle or breech-loading, for the "12" French gun held its own against the German gun and was superior to it in the same fights. The same feature was also apparent when the too rare "8" French guns faced the German gun. Although a muzzle-loader, our "8" gun silenced the breech-loading cannon of our adversaries, and the issue of most of the artillery combats of August, 1870, would undoubtedly have been different from what it was if our too light "4" gun had been everywhere replaced by the "8" gun.

The 75 gun once rendered useless in the first phase of the battle, which we have supposed to take place at more than 3 kilometres, is the superiority of the 90 gun established?

Yes, without doubt; for the tactics which would consist, on the part of the 75 gun, in declining the combat beyond 3 kilometres, and in unmasking only once the 90 gun in battery within that range, are easier to conceive than to put in practice. They would be "office" tactics. They could be brilliantly supported in a council, but it would not be the same

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on the field. They would resemble in theory a foot soldier armed with a repeating carbine possessing the ballistic qualities of the chassepot, and compelled to fight an adversary armed with the Lebel rifle. The infantryman first cited would of course sell his life dearly; but as to having the last word with his adversary, that were to admit that the latter would make the poorest possible use of the advantage of the 1,000 meters range possessed by his weapon, with reference to the zone of its deadly effect.

It is not contended that in other respects rapidity of fire may not become an element of tactical success in the cannon, as it is already admitted to be in the musket. The various European armies have adopted the repeating rifle, which makes it unnecessary to prove that the superiority of this weapon is evident in the eyes of all military authorities.

It will undoubtedly be the same with cannon within a few years; the different European armies will then have a "repeating" or rapid fire artillery matériel.

This new matériel will, however, present a striking difference from the new musket. While the caliber of the latter has been reduced at the same time that the rapidity of fire has increased, the caliber of the "repeating" gun can not be reduced.

The reasons for this "nonreduction" have been given in the course of the preceding analysis. The gun should be able to observe its own fire, a necessity that the musket does not labor under. To that end, it should fire the largest possible shrapnel.

It would be going backward to diminish the caliber of this shrapnel, under the pretext of obtaining advantages of another kind, however important they may appear.

The observation of fire being satisfied, the shrapnel should in addition, possess what is technically called "power."

IV.

This "power" may be roughly estimated as proportional to the weight of the projectile; which is, in fact, the definition that first comes to the lips in considering projectiles animated by similar velocities. However, the word "power" applied to a projectile, is at the present time understood in a restricted sense, that of the "explosive quantity" that measures a projectile's capacity; and this particular idea of "power," which was

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formerly confined to siege artillery, made its appearance some years ago in field artillery.

The 90 gun, a caliber used up to 1897 in France, in Germany, and in most of the European field artillery, was adjudged to have too little "power," and during recent years "high-powered" field guns were created, comprising a series of calibers higher than 90 millimeters.

In France the problem was solved in various ways:

(*a*) By lengthening the 90 shell up to 4½ calibers, so as to contain 2 kilograms of melinite.

We can judge of the power of this new projectile by comparing it with the old 90 bronze shell, which contained 300 grams of black powder, and produced in earth but one-tenth the effect of the new projectile.

(*b*) By lengthening the 95 shell in a similar manner, so as to contain 2½ grams of melinite.

(*c*) By creating a gun of 120 millimeters, throwing (1) a shrapnel weighing 20 kilograms, containing 630 bullets of hardened lead; (2) a shell elongated to 4½ calibers, containing six kilograms of melinite.

It is seen from the enumeration of the triple increase of power applied to French field artillery matériel, that the new elongated 120 shell has three times the power of the 90 shell; and the same enumeration permits of the proof of an analogous ratio of "power" with reference to the new 120 and 90 shrapnel.

It would be easy to cite like figures in relation to what has been called the "heavy field artillery" in Germany, Austria, and in Russia; let us content ourselves with recalling the ideas which governed our neighbors at the adoption of this artillery.

One of their authors has condensed them thus: "When the battle is sufficiently advanced for the value of the forces on the field to be calculated, then is the hour for the intervention of heavy projectiles, with the determination of deciding the battle. Thanks to their enormous effect, they will produce a shock that it would be impossible to obtain by other means, the moral as well as the physical effect being kept in view. The superiority of heavy projectiles is shown in their isolated effect, because of the power of penetration and explosive force which is peculiar to them, and in their total effect, because, during the same interval of time, a greater

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mass is hurled at the mark. This condensation of useful effect and this accumulation of destruction, present the appearance of a cataclysm, and produce, thanks to the accompanying surprise, complete depression in those whom they strike."

It is an evident deduction from these considerations that the rôle of "heavy field artillery" should begin with what has been heretofore characterized as the third phase of the artillery fight.

We can even on this occasion utter that paradoxical remark that the large-caliber gun is looked upon in Germany as the decisive instrument of success at close quarters, while our preceding analysis has indicated it to be the necessary instrument of success at long ranges.

We have shown in fact, that at the range of 4½ kilometers the large-caliber gun would have the advantage over one of small caliber, because, first, of the better regulation of fire, and second, because of the better "yield" of its projectile.

The comparison heretofore made of the effects of the 90 and the 75 gun at this range was, besides, only a particular instance of a general law, which would, in the same identical way, govern the 75 gun with relation to the 90 gun, and the latter with relation to the 95 and 120 guns, when similar projectiles are fired, in the fight at long distance, at the moment when the attacking artillery opens on its adversary.

It follows as well from the preceding German citation, with reference to the employment of heavy field artillery, that the Germans admit the superiority of the large caliber over the small at close quarters, when the attacking artillery has had the last word with its adversary. In short, from our analysis, it is apparent that the large-caliber gun is the alpha of the battle, and, from the preceding German ideas, it is evident that the same gun is its omega. The difference is that our analysis has placed especially in evidence the 90 cannon, while the German theory has had in view the 120 gun, the 150 howitzer, and the 210 mortar, which are the components of its parks of heavy field artillery.

It is permissible to rapidly draw the conclusion from this alpha and omega, that the power of the field gun, alias its caliber, is the principal element of its success, whether we consider the long ranges (4.5 kilometers) or the short (1.5 kilometers).

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The question limits itself, then, to defining what must be understood by "too large" caliber—that is to say, by incompatibility with the normal conditions of transport.

Briefly, has the 90 gun become a "too large" caliber?

The answer to this question frames itself. For fifteen years this gun has been running on wheels, without ever having been too heavy, save in the imagination of inventors of small-caliber guns infatuated with the four-horse team.

We must also examine the inverse question: "Has the 90 gun become a 'too small' caliber?"

To put the question is evidently to go directly against German reform; it is asking if the solution of the field artillery problem is not at the exact antipodes of the solution which cost three millions to the budget of "Beyond the Vosges."

Our conscientious reply is in the affirmative. Yes, the 90 gun has become a "too small" caliber. This opinion is based upon the new regime that the substitution of the "automobile" for the horse will shortly bring about in the artillery, as well as in all military and civil transportation.

The horse fixed at about 2,000 kilograms the total weight of the field artillery carriage capable of taking the trot; while the automobile permits of the increase of this figure up to 3,000 kilograms without taking anything from the mobility of the equipage.

It is, therefore, to the side of the caliber 95, or even 120, that the idea of the best field gun must incline, as soon as the automobile shall have shown what it is capable of, which will be at no distant day.

Hence the conclusion to be drawn is that, far from being diminished, the present caliber of our field gun should be increased. The existing condition is therefore in every respect preferable to a reduction of caliber.

V.

How then can we account for the folly committed by German military men, of retrograding in this reorganization of their field matériel, and wasting three hundred millions in the pursuit of an absurd idea?

We shall not undertake to explain it minutely, and, besides, nothing better can be cited in order to make their error understood than the instance of similar occurrences in France

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during the past five years, with regard to the substitution for our 90 gun of a rapid-firing 75 gun, similar to the one whose adoption by our neighbors has just been revealed by the *Unteroffizier Zeitung*.

Various types of rapid-firing guns have come nearly being adopted in France during these five years. We know of a dozen, among them the Schneider, the Darmancier, and the Canet, model of 1896, that have obtained the honor of official descriptions emanating from the war department. The best of these 75 guns was valueless as a field gun, in spite of real polygonal qualities. The army equipped with it would have been only a mouthful for the 90 gun opposed to it by its adversary. We were nevertheless on the point of finally adopting one of these guns, and asking Parliament for three hundred millions for the manufacture of Major Deport's 75 gun, which, in some respects, possesses more elegance and solidity than its rivals above mentioned.

In an essay entitled "Artillery and budget," which he published in the month of February, 1897, Captain Moch wittily related how he prevented our minister of war from complying with this demand. "For my part," he wrote, "it was a great satisfaction to think that I had been able to contribute, no matter to how small an extent, toward saving the country from such a serious mistake."

What is the right way to consider the immediate reorganization of our artillery matériel? In our view it is wisest not to consider it at all, and to congratulate ourselves that, on the other side of the Vosges, power has been sacrificed to mobility and rapidity of fire. Taking for granted that it may appear desirable to accomplish some progress in the direction of rapidity of fire, there is no better way to proceed with it than by taking as a basis for this progress the present 90 gun.

Is it possible at this time? We would be tempted to make a doubtful reply if a particular circumstance did not permit us to infer that the suppression of recoil in the present 90 gun may be looked upon as in a fair way to be solved by a French inventor. In such matters, one can not be too discreet; I shall not abuse the information which I was enabled to acquire through the friendliness of the inventor, a retired colonel of artillery, whose name can not be uttered here.

We were talking of rapid-firing cannon. It was last winter. The Colonel told of an idea that had occurred to him of a

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contrivance which, attached to the chase of the 90 gun, would suppress the recoil and return the piece to its first position by effecting automatically the canalization of the gases produced by the explosion of the charge one-thousandth of a second after the passage of the base of the projectile from the muzzle of the piece. On the following day the Colonel sought one of the gun manufacturers, who was known to him through his contracts for supplying the army and navy. In spite of its oddity, the Colonel's idea pleased the manufacturer, who at once made an arrangement with the inventor, and assumed the expense of manufacturing his contrivance. Although entirely new, the Colonel's idea was, without too much groping in the dark, realized in the practical model which justified the assertion that the problem was solved.

Then the minister of war and his colleague of the navy were notified by the inventor, who invited the two great chiefs to establish, through ocular investigation by the officers of their respective departments, to what extent the use of his patent could be of advantage to those departments.

The replies of the two great chiefs give food for reflection.

The minister of marine, or rather his right arm, General Larocque, immediately accepted the Colonel's proposal. The minister of war, or rather his assistant, General Delloye, declined the proposition. He gave as a reason for his refusal the necessity for a preliminary opinion by the "commission upon inventions connected with the national defense" upon the invention referred to by the Colonel. The Colonel had omitted to obtain the opinion of this commission.

We said above that these replies are of a nature to induce reflection. Is it really necessary to emphasize the contradiction between the two principal augurs to whom has been committed the care of presiding over our destinies? One asks for the preliminary opinion of a commission; the other dispenses with it. We shall not criticize the latter. Our readers will divine the truth. The minister of marine, seeing no roguery in the Colonel's invention, consents in a straightforward way to examine it. The minister of war, on the contrary, scents a diminution of his authority, and that of the artillerymen of Saint Thomas, in the discovery by an unsanctified one—the retired officer has fallen from grace—who triumphs in a domain hierarchically reserved for his own, and placed under the ægis of the famous commission.

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The inventor merely smiled at the dilatory answer of the minister of war. He said to himself, indeed, that if his invention was good—and he could not conceal it, for since the 15th of June it has been known by those who have had the curiosity to read the patents filed in the department of the interior—he would waive the patent of his contrivance in Russia, in England, in short, wherever the interested witnesses of the results obtained with his device should deem it advantageous to make use of and profit by it, as was the case with the Lemoyne bit, which was accepted by the French artillery only after its adoption by the omnibus company and by several English and Belgian societies.

We may then consider the question in a general way, and without regard to the advantages peculiar to France, and look at it from the standpoint of suppression of the recoil of any fieldpiece whatever, by the application of a device canalizing and regulating the current of gases produced by the powder.

What will remain of the reduction in caliber adopted on the other side of the Vosges, once the contrivance in question shall have shown what it is capable of?

Nothing, evidently, beyond the remembrance of a grave error.

In what has preceded, it is not only the Colonel's invention that is concerned, but every like discovery, for the idea which occurred to the Colonel in studying the vibration of gaseous bodies may occur as well under a different form to the mind of another inventor.

Independently of this supposition, the introduction of the "automobile" in the traction of field cannon will soon open to inventors of contrivances for the suppression of recoil a new field, in which neither the weight of the device nor its volume will longer be cause for its exclusion.

In fact, the "automobile" will bring about conditions analogous to those which have been created in our marine artillery by the use of machinery in our cruisers.

In our opinion, any change now in the field artillery would be a dangerous waste, unless it were founded upon the principle of mechanical traction. The latter is still for the time being in its infancy; however marvelous its results may appear as compared with those of animal traction, it is probable that they are but an indifferent sample of what mechanical traction will accomplish four or five years from now.

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It is not necessary either, to consider this "best," which is "to come," in the light of an enemy absolutely opposed to the immediate adoption of mechanical traction for our field artillery. Indeed, Captain Moch advocated, in his recent study, "Artillery and budget," the equipping of four or five only of our army corps with new matériel, whether muskets or cannon, whenever a discovery *worth the trouble*, should commend itself to the French army. Captain Moch thus set forth the advantages of this mode of reorganizing the matériel of war: "This method—armament by corps, successive adoption of matériel according to rule, abandonment of the habit of constantly renovating existing matériel—insures better administration of our finances, favors the rational development of an industry indispensable to the national defense and the most capable of maintaining the armament of our troops in constant touch with the progress of construction."

With this conclusion we bring this study to an end, adding that there never was a more favorable moment for the French army to await hopefully the improvements that mechanical art is about to lavish upon the traction of heavy vehicles.

France has won a great victory without having drawn the sword, a victory entirely unexpected, let us add, for the construction by Germany of the 75-millimeter gun has weakened at the same time her treasury and her artillery.

Let us be careful not to imitate in the smallest degree the example that the artillerymen beyond the Rhine are giving us; that would spoil our excellent position.

There could really be nothing more amusing than a fox captured by a fowl; it is, on the whole, a spectacle of the same kind that the German army is affording us at this moment free of cost.

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SUPPLY AND EXPENDITURE OF AMMUNITION.

By Captain BALCK,

Attached to the Infantry Regiment, Duke William of Brunswick, and Instructor of the War School at Engers.

Translated from the German

By First Lieut. ODON GUROVITS, Eleventh U. S. Infantry.

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SUPPLY AND EXPENDITURE OF AMMUNITION.

As far as the infantry arm is concerned, the question of ammunition supply in action is of decided importance. To solve it satisfactorily means, for infantry, success at every stage of an action. The first question to be answered is whether we are justified by our war experience in accepting the present ammunition supply of the infantry as sufficient under all circumstances, even in case the roads are blocked by troops, and the ammunition columns are unable to reach the battlefield promptly.

It would be useless for our purpose to go farther back than the Franco-German war, when breechloaders were used for the first time by both opponents. Every German infantry soldier carried 80 rounds of ammunition, and the battalion ammunition wagon drawn by six horses provided 20 rounds more for each rifle.

At the battle of Mars La Tour, August 16, the III. Prussian Army Corps had 21,050 rifles in the firing line, and fired 720,486 rounds during the day, or 34.5 rounds per rifle; yet there was dearth of ammunition on several occasions during the day. At noon, during a lull, the Thirty-fifth Regiment * was resupplied with 200 rounds per man, collected from the dead and wounded; but they were all fired away in the course of the afternoon, and there was lack again in the evening.

In considering the average expenditure of ammunition during an entire campaign, it might appear as if there never could be a lack of ammunition.

During the Franco-German war, the number of rounds expended by the I. Bavarian Corps was 4,163,000 (166 per rifle); the II. used up 1,105,600 rounds (44 per rifle); while the Saxon Corps expended 1,450,000 rounds (58 per rifle).

An attempt to make a similar calculation for the Prussian army was quickly abandoned, because specific data were not obtainable, except as to the number of rounds issued by the

* History of the regiment, page 32.

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reserve ammunition parks. The reenforcements forwarded from the Ersatz battalions brought with them no inconsiderable amount of ammunition, as each man before leaving for the field was supplied with 80 rounds; but there is no record available as to the amount so supplied. Moreover, for an accurate calculation, there would be required a statement of rounds expended in firing, and of rounds lost (including those of the killed and wounded). It is an established fact that in longer periods devoid of engagements a considerable number of cartridges was lost on the march and in bivouac. The same thing occurs on the field: on that of Hühnerwasser the commander of an ammunition column picked up 22,000 needle-gun cartridges, which had been thrown away in original, intact packages.

Dearth of ammunition in battle invariably occurred first with those troops who, when taking off their knapsacks, neglected to take out the tin ammunition cases,* or who sent their ammunition wagons to the rear to join the baggage train, as the Fiftieth Regiment did at the battle of Mont Valérien, on January 19, 1871, and the Thirty-eighth Brigade on the day of the battle of Beaune la Rolande.†

Few statements of ammunition expended in the several engagements are to be found in the regimental, etc., histories; and, where they are given, they are mere approximations and can not claim reliability.

One of the most obstinate engagements was the defense of the wall of Buzanval by the Fiftieth Regiment, on January 19, 1871. At this point the enemy's superiority was overwhelming. The attacking forces were disciplined and good, but in spite of this, the regiment referred to exhibited the same splendid fire discipline as at Lunby. The fight lasted for nine hours. Lieutenant General von Boguslawski says:‡

"It is no longer possible to ascertain the number of cartridges fired; the daybook of the Second Battalion alone contains a statement of ammunition expended amounting to 14,206 rounds. Considering that the Fifth Company did not fire a shot that day, and that the Seventh only fired occasionally, the greater part of the expenditure falls on the Sixth and

*Experience of the Twelfth Rifle Battalion at Sedan, Official Account, Vol. II, page 1175.

†Honig, Volkskrieg, Vol. II, page 259.

‡Page 350, History of the Fiftieth.

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Eighth companies. There is no record with the Second Battalion of the ammunition brought up from the rear. It may be stated that during the battle the Twelfth Company was supplied with 3,000 rounds. The company being 180 strong, each man received an addition of 17 rounds, and therefore had 97 rounds available for use. Since on returning to quarters the supply of ammunition still averaged 5 rounds per man, 92 rounds per rifle having been expended, it follows that during the battle, which lasted nine hours, each man fired a little more than 10 rounds per hour.

"In the battle of Beaune la Rolande some of the companies of the Fifty-sixth ran out of ammunition at Romainville. The First Battalion, Fifty-seventh Regiment of the Thirty-eighth Brigade was able to replenish its ammunition directly from the ammunition wagon at Romainville. This did not help the defenders at Beaune, who did not receive any additional ammunition until toward the end of the battle, when one ammunition wagon (F 16) was brought up and its contents distributed: this ammunition, however, was not used that day. All the ammunition wagons having been sent away at the beginning of the battle, this brigade was therefore, restricted to the ammunition carried by the men, although some organizations pertaining to the III. Army Corps assisted by giving up some of the ammunition carried by their men. Thus, this battle was also fought to a finish with the ammunition carried by the individuals, *i. e.*, 80 rounds per man. The attack of the French not being simultaneous along the entire line at the battle of Beaune, local pauses ensued. In such crises the troop commander watches most carefully the consumption of ammunition at the most important points; and with disciplined troops, it is not difficult to keep the most threatened points supplied with ammunition, by simply passing it along the line." Such was the case at Beaune. It is true that, by this method, at certain points in the cemetery the expenditure was 200 rounds per rifle, but at others only the average of 40 rounds per man was reached. After all, the final result, which alone is to be considered, shows that the demand was supplied almost entirely from the 80 rounds carried by each soldier. Furthermore, on November 29, a number of unfired cartridges, as well as original unopened packages, were found in the position occupied by the Thirty-eighth Brigade.

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As to the number of rounds expended in the battle of Bapaume, January 2 and 3, 1871, the records are unfortunately very meager. The History of the Twenty-eighth (page 222) shows, however, that in the stubborn fight at Sapignies, January 2, 1871, this regiment fired 21,104, and only 15,609 at Bapaume, January 3, 1871 (page 229).

In the battle of Champigny, November 30 and December 2, 1870, the five battalions of the Würtemberg Brigade fired an average of 40 rounds per day and rifle.*

In the battle of Orleans, both battalions of the First Hessian Infantry Regiment expended only about an average of 5 rounds, and the First and Second battalions of the Second Bavarian Regiment, 50 to 60 rounds per rifle.†

In the first battles of the war the number of rounds expended appears insignificant; this is accounted for by the training and tactics of the Prussian infantry, as well as by the efficient assistance always rendered by the artillery; the small range of their rifles did not warrant an earlier opening of fire, as is seen by the following examples:

At Spicheren the First Battalion of the Thirty-ninth fired 8,160, and the Second only 5,500 rounds, while the Third fired 12,080 rounds, which is very instructive.‡

As to the expenditure of ammunition by the Second Foot Guards, we can make an intelligent guess from the following facts: At St. Privat, on August 19, the First Battalion needed 27,340, the Second 17,820, and the Fusilier Battalion 7,870 rounds to replenish its ammunition. Allowing for the large casualties of this regiment, the average expenditure does not appear to be very high. At 10.30 on the evening of August 18, the Guard Rifles were supplied with 20 rounds per man, and the ammunition wagons were still full.

On the part of the French, the expenditure of ammunition was, in every case, decidedly greater. At Champigny, each French infantryman had with him 108 rounds, which proved the average of the total expenditure of ammunition of the army of the Rhine, from August 6 to 31, to be 30 rounds per rifle; and, during the engagements on the 16th and 18th of August, it was, respectively, 13 and 27 rounds. When we go

* Kunz, Ausfallschlachten—sortie battles, page 103.

† Kunz, Orleans, page 233.

‡ Page 303, History of the Thirty-ninth.

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into details we find far higher figures: On August 16, some troops of Grenier's division, against which the attack of the Thirty-eighth Brigade was directed, claim to have fired as many as 150 rounds per rifle, and, on the evening of that day of battle, the commanding general of the IV. Corps reported a lack of ammunition. It was lack of ammunition also that caused Bazaine, on August 17, to fall back upon Metz; the ammunition supply of the VI. Corps, at any rate, could not be replenished prior to the attack by the Prussian Guard, notwithstanding the proximity of a fortress like Metz. In the case of the Twenty-fifth Infantry Regiment, we have some detailed data.* This regiment had but 30 rounds per man, instead of 90, and was assailed by the Franz Regiment and the Third Guard Regiment (which lost 2,160 men, 9 per cent of the shots fired against them being effective). The statement in the History of the Second Guards that, on August 18, each French rifle had 300 rounds at its disposal (page 232) can not be sustained by French testimony.

In the Russo-Turkish war of 1877–78, the average of the total expenditure of ammunition on the part of the Russians amounts to 33 cartridges per rifle and carbine.

The following detailed statements of ammunition expended are instructive:

In the engagement at Aiaslar on August 23, 1877, the Russian Sofia Regiment fired 94 rounds per rifle. At that time each soldier carried 60 rounds in his cartridge boxes, and an additional 60 rounds per rifle were carried in the ammunition carts, while the ammunition parks contained a further supply of 100 rounds for each man.

At Plevna on July 20, 1877, the Russians used within six hours all the ammunition carried on the soldier's person and in the company carts; and July 30, at the second attack on Plevna, there was expended in four hours all the ammunition carried by the men. In the battle at Lowtscha, the Third Rifle Brigade did not fire, except in pursuit, yet its commander reported afterwards that the ammunition ran out. The ammunition wagons did not follow in rear of their own troop units, and there was no provision made for bringing up ammunition.†

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*Paquie le tir en terrain varié, page 39.

†Kuropatkin-Krahmer, Kritische Rückblicke, page 88.

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The following shows the expenditure of ammunitio
regiments participating September 1 in the unsuccessfu
upon the Omar-Bey-tabia:

	Rounds.
Sixty-third Regiment (1½ hours in action)	55,296—(21
One hundred and nineteenth Regiment (1½ hours in action)	99,744—(43
Sixty-fourth Regiment	24,650—(10
One hundred and eighteenth Regiment	45,360—(24

In the Kasan Regiment (Sixty-fourth), which fired t
number of rounds on that day, the ammunition ra
the very moment when the successful and decisive
stroke of the Turks began. The same misfortune h
to other troops after a comparatively brief duration
fire action.

At the storming of Scheinowo, January 9, 1878, ev
of the Eleventh Rifle Battalion fired away 120 rounds
hours (0.5 round per minute).

The expenditure of the regiment at Karahassankioi
to 155 rounds, and of the Thirteenth Rifle Brigad
Shipka, December 28, 1877, 122 rounds per rifle.

Rapidity of fire was utilized by the Turks to a
hitherto unknown. Each battalion was followed i
fight by 30 mules, carrying 60,000 rounds, and each r
ried 100 to 120 rounds. At Gorni Dubniak, acco
reports, each man could avail himself of from 80
rounds; at any rate, it is a fact that in a fight of nine
half hours' duration the defenders of this group of eart
3,570 strong, placed 3,533 Russians *hors de combat*,
loss of only 1,280 dead and wounded Turks. Dur
attack some of the riflemen succeeded in firing more t
rounds. Kuropatkin found 120 empty shells near o
killed.* In the battle at Taschkessen, December 3
lasting eight hours, the Turkish Prisrend Battalion f
the Tuzla Battalion 275, and one rifle battalion 263
per rifle (0.5 round per minute).

In 1878, in Bosnia, a company of the Sixty-first A
Infantry Regiment fired 70 rounds in two hours, a
battalions of the Eighth, 70 rounds per rifle in one
half hours.

The attacks of the survivors on the position of t
garians at Sliwnica failed on account of the pr

* Kuropatkin-Krahmer, page 170.

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opening of fire by the infantry and the consequent extravagant expenditure of ammunition, which left the assailant without any at the short ranges.

On the first day of the battle, the Fourth Servian Regiment, after expending all its ammunition, retired from the position it had carried. Nor was there more economy of ammunition on the opponent's side. On the third day of the battle, the Fourth Battalion of the Fourth Bulgarian Regiment fired in two hours about 185 rounds per rifle at a range of 600 paces. The total average of ammunition used in this case is higher still, because in the captured position a great number of Servian cartridges was found which fitted the Berdan rifle of the Bulgarians.

During the civil war in Chili in 1891 the Congressional troops, which were armed with magazine rifles, managed to fire so rapidly that in many cases their packet ammunition of 180 to 200 rounds was exhausted in thirty-five to forty minutes. For the action at La Placilla, which lasted four hours, 120 rounds per rifle were fired, and 160 to 200 at Concon, and after one hours' fighting there was a scarcity of ammunition, just at the time when the particular stage of the battle demanded a pronounced increase of fire. At the end of the day's battle, which lasted twelve hours, some of the infantry had but five or six rounds per rifle, and there was no opportunity for replenishing their ammunition until the next morning.

The excessive, often senseless, rapid and long-range fire of the Chilians and Turks certainly can not be taken as a model, though in some cases it was not without effect. It was entirely due to insufficient musketry instruction, bad fire control, and poor discipline. Considering the examples cited, 100 to 150 rounds per rifle seem to be sufficient in any fight; but exceptional cases and situations may occur, when a larger amount can be fired to advantage, and such conditions must be given weight in estimating what should be the number of cartridges for the infantry carried by the soldier and in the ammunition wagons. It should be borne in mind that it is difficult to replenish the ammunition from the ammunition columns after a battle, unless each army corps has a separate road to march on. If that is impracticable, then the replenishing of infantry ammunition meets with almost insurmountable obstacles.

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At the present time the ammunition supply in the most important armies of Europe is as follows:

GERMANY.

Ammunition carried by soldier.	In company ammunition wagons or carts.	In reserve establishments.		Totals per man.
Rounds.	*Rounds.*		*Rounds.*	*Rounds.*
150	50 (about)	Infantry ammunition column 79.5 Field ammunition park 14.5	94	294
		AUSTRIA.		
100	42	Divisional ammunition park 57 Corps ammunition park 27	84	226
		ITALY.		
112	21	Divisional artillery park 30 Corps artillery park 50 Army artillery park 7 Army central artillery department 10	97	230
		ENGLAND.		
100	65	Company wagons 20 Divisional ammunition column 77 Ammunition parks 66	157	322
		FRANCE.		
120	80	Ammunition sections 65.7 Park of army corps 47	112.7	314.7
		RUSSIA.		
*84 †120–150	48 70	Flying artillery park 53.3 Mobile artillery park 11.5	67.8	196.8

* Berdan rifle. After adoption and issue of the .3-caliber rifle each soldier is to carry 150 rounds; but according to another statement each man is to carry 60 rounds in his belt, 30 in breast pockets, and 30 more in a reserve pocket. The Swiss and Turks also carry 150 rounds, while the Belgians carry 120.

†.3-inch rifle.

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REGULATIONS OF VARIOUS ARMIES RELATING TO REPLENISHING AMMUNITION.

GERMANY.

(Field Service Regulations 349–353.)

As laid down in the field service regulations, the supply of ammunition is governed somewhat as follows:

The company ammunition wagons march together by battalion, which facilitates supervision and enables the battalion commander to exercise some control over the ammunition supply. Companies acting alone, or as advance guards, are followed by their own ammunition wagons. To unite the ammunition wagons by regiment or brigade does not seem advantageous, owing to the distance that would separate them from their troop units. Before marching into position, the contents of the ammunition wagons are to be distributed among the men, who can carry the same in haversacks, trousers and coat pockets, etc. The mounted conductor leads the emptied ammunition wagons to the rear, where they are replenished from the ammunition columns by exchanging ammunition cases. They immediately endeavor to regain contact with their organizations, but are required to furnish ammunition to any troops that may ask for it.

On the battlefield, the ammunition wagons, if not emptied, conform to the movements of the respective companies (as is to be inferred from the suppression of paragraph 3152 of the Field Service Regulations, edition of 1887), and, under the direction of their mounted leader, take up a covered position as close in rear of their engaged organizations as practicable (probably within 800 meters); in urgent cases, without regard to losses. To the troops in the firing line, when once engaged, ammunition is brought as far as practicable by every reenforcement thrown forward. It is laid down, as a principle, in case ammunition is to be brought up to the firing line by individual men, these men must be furnished by troops in the rear who are not yet engaged.

The contents of an ammunition case (1,125 rounds, weighing 42.7 kilograms) can be carried by two men, one of them carrying three (23.1 kilograms), and the other two (15.4 kilograms) packages of cartridges.

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It is the duty of the battalion commander to see that the ammunition taken out of the ammunition wagons is promptly replenished. Prior to the arrival of the ammunition columns, higher commanders will do well to constitute a ready reserve from the ammunition wagons of the unengaged troops. It is also recommended that a few additional ammunition wagons, belonging to the forces kept in reserve, be assigned to those organizations which will, in all probability, need an increased number of cartridges.

The ammunition of the dead and wounded must be collected and distributed. If this is done by the men of the advancing firing line, the forward movement is liable to be checked, and skulkers have an opportunity to stay behind. It might be advisable to assign this duty to a few men (musicians) under the orders of a noncommissioned file closer. Leaders, as well as men, should endeavor to utilize every possible opportunity for replenishing their ammunition, without waiting for orders, and take care to have not only the prescribed number of cartridges, but as many more as possible.

If a defensive engagement is contemplated, one of the preparatory measures is to deposit additional ammunition in the firing line beforehand, either in original boxes or some other kind of receptacle. As regards the use of ammunition, it is recommended to use first the cartridges deposited in cups, or carried in haversacks and coat and trousers pockets, and next that in the rear cartridge pouch; the ammunition in the right pouch should be invariably reserved for the decisive moment, when rapidity of fire is of great importance.

Whenever replenishing ammunition, the right pouch is first filled, then the left, and any remaining cartridges are put into the haversack and coat and trousers pockets.

AUSTRIA.

(Drill Regulations 574–585.)

These directions are very detailed and deserve special consideration. When an engagement is expected, each man is furnished with 20 additional rounds from the company ammunition wagon* before leaving the camp or reserve position,

*The company ammunition wagon contains 9,450 rounds in seven cases; consists of a fore and after body; has a gauge of 1.13 meters, and is provided with eight carrying bags. It is distinguished in daytime by a red flag, and at night by a green lantern.

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and each noncommissioned officer with the number of rounds prescribed for a private. When the action opens the ammunition wagons are kept well together and, taking advantage of every possible cover so as not to attract the enemy's attention, follow the battalion reserve until it is absorbed in the firing line, when they follow the regimental reserve. When exposed to artillery fire, an interval of 20 paces is preserved between wagons. The wagons are under the direction of the battalion adjutant or senior accountant noncommissioned officer present, as may be ordered by the battalion commander.

In an offensive action, the replenishment of the ammunition is only feasible within the outer limits of the midrânges (1,000 paces or 750 meters from the enemy); at a closer distance it becomes very difficult. The firing line then is supplied with additional ammunition by the reenforcements, or by smaller detachments under noncommissioned officers sent forward from the reserves, which, after distributing the ammunition, remain with the firing line. Actively engaged companies utilize every opportunity to replenish their ammunition and to equalize it among themselves.

In a defensive engagement, the ammunition wagons may be emptied before the action begins and sent to the rear to be refilled; any further replenishment of ammunition is managed as in an attack. When immediate help is necessary, and no other means is obtainable, part of the ammunition of the reserves may be sent to the firing line. The dead and wounded are to be relieved of their ammunition.

Any organization asking for ammunition will be fully or partly supplied, depending on the urgency of the case and the available supply.

RUSSIA.*

The ammunition wagons are partially emptied during the deployment for action. By the time the zone of effective fire is reached (560 meters from the enemy), the troops are still to be in possession of their full ammunition supply, because at close ranges it can only be replenished with the greatest difficulty.

Should lack of ammunition occur in the firing line, ammunition is forwarded from the reserves in baskets by detachments of from 6 to 10 men under a noncommissioned officer.

*The company ammunition wagon, model '93, weighs 287 kilograms when empty and 770 kilograms when loaded, and carries 14,000 cartridges (useful load 48 per cent), or 70 rounds for each rifle.

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Each basket contains 288 Berdan cartridges (13.6 kilograms). In lieu of baskets, capes, coats, and blouses may be used.

FRANCE.

(Field Service Regulations of May 28, 1895, paragraphs 89–94.)

In quarters and on the march the ammunition is replenished by utilizing that of the sick or detached men, and not until this source is exhausted may the company wagon* be called upon for this purpose. If an engagement is expected after a short march, the wagons are to be emptied before the troops march off; but if, for any reason, this is impracticable, the four company wagons follow in rear of their battalion. It is the battalion commander's duty to supply the firing line with ammunition. During the action, the empty wagons are not refilled from the ammunition column. The dead and wounded will be relieved of their ammunition. As soon as the company wagons are emptied, they are replaced by wagons from the ammunition columns. The order for sections of the ammunition columns to come to the front is issued by the division commander. The commander of the ammunition section sends ammunition wagons to the front without further orders whenever notified by any troop commander that the company wagons have been emptied.

The ammunition wagons are ordered to march to the place where the company wagons assemble; thence they advance, by order of the troop commander, into the firing line, or near to it.

Every pause in the action or lull in the enemy's fire is taken advantage of to distribute the contents of the company wagons, or of the wagons of the ammunition sections.

In battle it is prohibited to send wagons or men to the rear for the purpose of getting a fresh ammunition supply; which principle applies not only to the organizations actually engaged, but also to the groups of company wagons and ammunition section wagons.

The brigade or division generals may order one or more of the filled company wagons belonging to some unit of their command to replenish the ammunition of any organization of the brigade or division. These wagons proceed to the vicinity

* Each company has a 2-horse company wagon. It weighs 450 kilograms empty and 1,054 kilograms when loaded, and carries 16,384 cartridges, 36 pioneer tools, and a tool chest (useful load 45 per cent). In the absence of cartridges, the wagon can carry 54 knapsacks.

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of the designated organization and return to their proper regiment after accomplishing the object.

In the absence of an order from a general officer, the united company wagons of a regiment, or the four wagons of a battalion, will not issue ammunition to an outside organization without the permission of the regimental or battalion commander.

On the battlefield there is danger in delay, and the sections of the ammunition columns are bound to issue ammunition to any organization, whether belonging to their own or to another division.

ENGLAND—INFANTRY DRILL.

The battalion commander is held responsible that the battalion has 185 rounds per man.

The brigade commander determines the position of the four battalion ammunition wagons in such a way that two wagons and two pack mules (each carrying 77 kilograms of cartridges) shall follow the battalion directly into action, while the other two wagons follow in rear of the brigade. The supervision of these wagons is exercised by an officer (adjutant), who is assisted by one sergeant and the pioneers of the battalion.

In distributing ammunition to the carriers (1 noncommissioned officer and 2 to 3 men for each of the eight companies), the mules are used to bring the ammunition to within 500 meters of the firing line, whence it is taken to the companies in the firing line by the carriers, one man not being required to carry more than 600 rounds (16 kilograms). Should the demand be greater, the officer with the ammunition wagons advances with the men under his immediate command, and has the ammunition delivered to the file closers in rear of the firing line, who see to its further distribution.

The carriers remain with the companies in the firing line. The file closers' duty is to see that men going from the firing line to the rear give up all their cartridges except the few rounds necessary for their self-protection. File closers are also to gather the ammunition of the dead and wounded and distribute it among the firing line and supports. Ammunition wagons will close up to within 900, and pack mules to 450 meters of the firing line; in covered terrain these distances will be reduced accordingly. The great advantage of having cartridges in close proximity to the firing line and out of sight of the enemy will outweigh any disadvantages resulting from having the ammunition wagons very close.

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CONCLUSIONS.

The extracts from regulations given here contain too many restrictive prescriptions for an action against European troops, well trained in firing; for, exposed to the severe fire of such an enemy, file closers would hardly be able to attend to all of their duties as prescribed.

What, then, are the deductions to be drawn from the extracts quoted from these various regulations?

I. At the beginning of an action, but not too early, the contents of the ammunition wagons are distributed, because the packing and unpacking of ammunition consumes time, and because the soldier, burdened at the wrong time with 50 additional rounds (1.65 kilograms), stowed away in his haversack and pockets, will not march so well. It is also recommended that the noncommissioned officers be supplied with the same number of cartridges as the men, which cartridges could be distributed among the men during the action.

II. After replenishing from the advanced ammunition columns, the ammunition wagons must at once endeavor to regain contact with their battalion and follow them as closely as circumstances will permit. The expenditure of ammunition is never likely to be uniform along a firing line; therefore, if the battalion commander controls the four ammunition wagons of the battalion, he is better able to equalize the ammunition than when the company ammunition wagon is required to follow its own company, which is sometimes difficult to find.

III. It is the commander's duty to assign additional ammunition wagons, from those belonging to troops held in reserve, to organizations which will probably require an increased supply of cartridges.

IV. On entering the effective zone (600 meters from the enemy), the firing line must still have an ample supply of ammunition. In exceptional cases only, will it be practicable to send to the rear for ammunition; and in most cases it is rendered impracticable by the severe fire of the enemy. Only the best men could be used for this purpose, and it would be asking too much to make them cross the fire-swept zone twice. Furthermore, the best men are needed right in the firing line to urge on the weaker element, and to replace disabled group leaders. To take the men to the rear to replenish their own ammunition directly from the ammunition wagons

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must be prohibited on general principles; an unexpected attack might find the position unoccupied and entail the loss of the ammunition wagons.*

The supply of ammunition must always proceed from the rear to the front.

V. The ammunition of the dead and wounded can only be gathered by troops on the defensive, or on the offensive when the attack has come to a stop; during an attack it is out of the question, as tending to delay the advance and to favor straggling.

VI. It is not advisable to have ammunition brought up from the rear by independent individuals, as it favors straggling, and because the ammunition will not reach the firing line if the carrier is wounded or killed. For the reasons stated, either each reenforcement should carry a supply of ammunition for the firing line, or ammunition should be sent to the firing line by detachments in extended order, under command of noncommissioned officers. According to the note to section 350 of Field Service Regulations, we need 20 men, each carrying two or three packages of ammunition (450 or 675 rounds, weighing 15.4 or 22.1 kilograms) to transfer the contents of a company ammunition wagon to the firing line. These detachments, after reaching their destination, would remain there.

One more question is to be considered: How is the firing line to notify the troops in rear that ammunition is running short? Even if there were no possibility of misunderstandings, it would be inadvisable to adopt a special trumpet call, as was temporarily done in Russia, because the sound would be drowned in the rolling sound of the skirmish rifle; and the use of flags, as on board of our war vessels, is incompatible with the conditions of the action.

Therefore, until some new and successful method is adopted, everything rests with the commanders of the troops in rear, who must carefully watch the progress of the action and forward additional ammunition to the firing line before this line reaches the decisive ranges.

* Loss of the park of Coulmiers; Helvig. The I. Bavarian Corps, p. 202. Action of Daix, January 21, 1871; History of the Sixty-first, p. 174; also Kunz, Loigny-Poupry, p. 17.

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FOREIGN WAR GAMES.

FROM THE REVUE MILITAIRE DE L'ÉTRANGER,
AUGUST AND OCTOBER, 1897.

TRANSLATED BY
MAJOR H. O. S. HEISTAND, ASSISTANT ADJUTANT GENERAL, U. S. ARMY.

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FOREIGN WAR GAMES.

The war game (called in Germany Kriegsspiel), or rather competitive maneuvering on the map, in favor in most foreign armies, is designed to perfect the instruction of officers by utilizing the winter period, during which maneuvers and drills on varied ground are rarely possible on account of the small number of well-drilled men and the rigors of the season.

This instruction is composed of two entirely distinct parts.

The first is theoretical, and involves a knowledge of rules and mechanical execution of movements, or evolutions, on the drill ground; while the second is practical or, more accurately speaking, tactical, and consists in applying, in a concrete case, the best means and principles to insure the success of a well-defined purpose.

Theoretical instruction is easily acquired. In the first place, officers are supposed to know the tactical object of evolutions and formations, and once this result is accomplished, the study of their mechanism on the drill ground presents no greater difficulty than the execution of the strict rules laid down in drill regulations.

It is not so with the second, which can be acquired only through individual effort, aided and directed by superiors. For an officer to possess knowledge is not sufficient; he must know how to utilize it. The questions are: Under what circumstances will he be called upon to utilize it? In war, in battle, where any loss of time, any hesitation, any mistake results in disaster. Will instruction which is purely theoretical suffice at such a moment? Certainly not, for it only applies to general cases; its rules and principles are only indications, totally insufficient for special and exceptional cases. Now, everything is exceptional in war, and whoever relies upon his memory, or assumes to govern his action by a formula or set rule, and considers it equally applicable to all ground and in all situations, must not hope to succeed.

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It is necessary, in any situation whatever, that an officer be able at one and the same time to make a rapid decision appropriate to the circumstances and to express it no less rapidly in clear and concise orders. But few men are so well endowed as to possess these qualities intuitively; the greater number can acquire them only by patient industry. So long as the officer could learn his trade on the battlefield itself, he had no need of the instruction here in question; but just in proportion as wars are becoming more rare, and the officer has had less and less occasion to exercise the functions of his profession—the very essence of the reason for his existence—the proper means of developing his tactical knowledge has been increased in time of peace.

Drills on varied ground, garrison maneuvers, grand maneuvers, practical instruction without troops, and staff journeys succeed each other time and again, giving to the officer an opportunity for practice in particular cases and on different fields. He can thus prepare himself for the rôle he will have to play in time of war—a rôle the difficulties of which will then be augmented by the new factors—danger and the unknown. But maneuvers in time of peace, which constitute the true school for officers, do not entirely meet the requirements. Field exercises in the vicinity of garrisons are always very limited on account of agricultural interests; and grand maneuvers, occasioning very heavy expense, are necessarily of short duration; one prominent factor, important for instruction, the unknown, is practically eliminated from both, for a participant is always quite familiar with the composition and strength of the opposing forces; moreover, they can be conducted only during a certain portion of the year.

Much inventive talent has been exercised in trying to supply these deficiencies. Means have been sought to represent the operations of war in a tangible manner without the cooperation of troops, and the most important result of these efforts was the discovery and perfection of a judicious and practical method of competitive maneuvering on the map. But the period of evolution which culminated in that result was long, and nothing in the first attempts foreshadowed the definite form which it has assumed.

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The object of this paper is to present a view of the different phases through which the "war game" has passed and to review the works devoted to it in foreign military literature.

It is divided into three distinct periods:

The first, that of the "game of war chess," reaches from the time of its invention to 1824. At that epoch commences the second period, that of the war game proper. Its promoters were Lieutenant von Reisswitz and his father, counsellor of the war department, who, abandoning the chessboard, made use of maps, and prepared for its execution a set of rules, which, with certain modifications, were used until 1875.

Finally, the third period, which one may call that of *Competitive map maneuvers*, is characterized by the works of Captain Meckel and of Colonel von Verdy du Vernois.

* * * * * * *

FIRST PERIOD—THE GAME OF WAR CHESS.

The principal promoters of the "game of war chess" in Germany are Helwig et Venturini. Helwig, a master of pages at the Court of Brunswick, first, in 1780, made public the rules of the game, and should be considered as its real inventor. Venturini, a tactician, author of "A mathematical system of applied tactics and of the science of war proper,"* published later, in 1797, the "Rules of a new war game for the use of military schools."†

At the end of the last century, military studies in Prussia had assumed a purely scientific character; a new science was born—*Mathematical military science.* Received with favor, sanctioned by the royal order of June 7, 1790, regulating the course of study at the "War Academy," these theories made sensible progress. "The tactical and strategical writings of that epoch had, for the greater part, an outlandish resemblance to a course in geometry; a true strategist of that epoch did not know how to lead a corporal's guard across a ditch without a table of logarithms."‡

* "Système mathématique de tactique appliquée et de science proprement dite de la guerre."

† "Règles d'un nouveau Jeu de la guerre à l'usage des écoles militaires."

‡ V. der Goltz. Rosbach et Iéna, translation by Commandant Charbert, pages 287, *et seq.*

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The game of war chess also felt that influence.

An examination of the inceptive state of the war game evidently presents but a purely retrospective interest; however, we believe it necessary to give a few details solely on account of their originality.

In a letter dated September 26, 1801, Helwig wrote: "You know that it was in the year 1780 that I published my first essay on the tactical game. That idea came to me first through a need which I experienced of rendering sensible, not to say palpable, a few principles and rules of the military art which my position as professor to the pages of the Duke of Brunswick required me to teach those young noblemen, destined some day for military service. Independently of this chief object my secondary one was to offer those who had no need of such resources an agreeable recreation by laying before them a game which, at first sight, presented different objects and operations, and which depended upon nothing but the rules and combinations made by the players.

"The first thought which presented itself to my mind was that the learning of my game ought not to be burdened with too many details if it was to fulfill its mission. I judged from the first that I should achieve my object in the quickest way if I took for its basis the game of chess, in favor with so many distinguished persons of all ranks. My idea was to adapt, as far as possible, the game of chess to my own game, in order so to interest amateurs that they would at least give mine a trial.

"I was not deceived in my expectations, and experience confirmed the wisdom of my judgment, for chess players were the first to welcome my invention; they found it a great source of amusement, and set to work to make it better known. Numbers of military men, profound in the theoretical and practical science of their art, examined it to see if it were possible that the principles of tactics could receive sensible development through channels of pure recreation. They were not disappointed in the ideas they had conceived of it; they recognized in it a very efficacious means for awakening the attention of young men destined for military service, by creating in them a taste for it, and for lessening the difficulties of instruction."

Such are the motives which induced Helwig to adopt the form of the game of chess for his invention. We shall now glance at the rules he adopted for playing his tactical game.

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The chessboard consisted of 1,666 small squares, about 3 centimeters on a side, placed side by side and tinted in various colors. These were either pasted on a card and represented a single feature of the terrain, or were represented by colored cubes, joined together, and placed in a frame. As the cubes bore on each of their faces one of the six colors adopted, the configuration of the terrain represented could be almost infinitely varied. The colors were as follows:

Black and white squares represented level ground.

Red squares indicated mountains inaccessible to troops and rendering firing impossible.

Green squares represented marshes which, though not practicable for troops, permitted firing over their surface, and another shade of green represented forests.

Blue squares served to indicate lakes or ponds, a line of blue squares serving for a water course which could be crossed only by aid of pontoons.

Squares half blue and half red denoted buildings, villages, or cities.

A dotted line through the middle divided the chessboard into two camps and marked the frontier.

Finally, in order to represent easily the different changes and accidents of ground, each square bore a number, and the theater of operations was divided into provinces, which were designated by letters.

Each side had in the corner of its chessboard a fortification, in which parapets, ditches, and other defenses were indicated by conventional signs, and which figured as the adversary's objective: it took the place of the king in chess, for the taking of the last square of the chessboard, which represented the citadel, signified the winning or losing of the match.

Troops were represented by pawns similar to those used in chess: all the pieces were considered, not as individuals, but as battalions of infantry or squadrons of cavalry.

The players received in each camp the same number of pawns, which could be grouped as desired before the commencement of the match. Several players could be chosen for a match, one of them having the direction of the game.

To each player were assigned:

60 battalions of fusileers or grenadiers, which also acted as artillery;

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25 battalions of pontoniers, which also performed service as grenadiers and as artillery;
8 squadrons of dragoons;
12 squadrons of hussars or light cavalry;
10 batteries of fieldpieces;
3 batteries of siege guns;
2 mortar or shell gun batteries;
100 pontoon boats, and
200 pieces of cardboard to indicate intrenchments.

Besides the eight squadrons of dragoons each party had four squadrons of dragoons dismounted, each represented by an infantry piece surmounted by a hat. These four pieces remained out of play until the moment the player wished to use them, when they were exchanged for four pieces of dragoons which had been dismounted. The hat was also used to indicate pontoniers.

Each pontonier pawn could put four pontoon boats in place; to designate the number of boats any pontonier had at his disposal, there were supplied four flat caps marked with 1, 2, 3, or 4 points. As a pontonier placed a boat, the player took away from him a cap and substituted another for indicating the number of boats remaining at his disposition. The same operation was applied inversely, when a pontonier took up a boat which had been in use.

The troops marched and fought according to fixed rules very similar to those of chess.

The infantry and cavalry, like the queen in chess, could march in any and in all directions in a straight line. The infantry could, in one move, advance eight squares; heavy cavalry, twelve; light cavalry, sixteen. The latter could also move like the knight in chess. The artillery had all the movements of the castles.

Very minute rules governed the conditions of the contest, whether with side arms or firearms; and numerous precepts set forth the methods of employing artillery, pontoniers, trenches, etc.

Such was, as a whole, the first effort at creating a war game. It was a great success; and a number of military writers, not only in Germany, but in Italy and Austria, hastened to follow the example and proposed tactical or war games based on the same principles.

In France, M. Cramer, a printer and publisher and an ex-professor in the University of Kiel, took it upon himself to

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introduce Helwig's invention. He commenced by using the press to obtain desired publicity, and the *Journal des Débats* of "10 Nivôse an XI"* printed a very eulogistic article concerning it. M. Cramer brought out a tract giving a general idea of the rules of Helwig's game, and followed it with an appeal for voluntary subscriptions to cover the expense of a new and complete edition.

"Until a subscription sufficient to meet the cost of printing shall have been raised, he invites all possible friends of the game in Paris to become acquainted with it by following a *theoretical and practical course* to be offered by him for the purpose. This course is to last one month, and will be held in his lodging, No. 12 Rue des Bons-Enfants, on Mondays, Tuesdays, and Wednesdays, between 7 and 10 p. m. (to begin the 16 Ventôse†). Persons wishing to take the course are invited to register their names at the hours indicated, three days before the lessons are advertised to begin.—Paris, 20 Pluviôse, year XI."‡

We do not know that this war game met with great success among officers of the Army of the Rhine and the Army of Italy. Be that as it may, the game of war chess had very strong supporters and remained in favor for many years. The *Militärische Blätter* of 1822 speaks of it in the following terms: "One or two of these games introduced into the military schools would serve a most useful purpose. They would enable the pupil to learn in a rapid, amusing, and interesting manner a great many important tactical and strategical rules, and impress them upon their minds in a deeper, clearer, and more precise manner than long fatiguing lessons or lectures, listened to with indifferent attention and quickly forgotten. * * * ."

Marshal Ney expressed his opinion in the following manner: "I consider it the best school of our profession, and I should like to see it introduced into the military schools and large garrisons."

General Moreau said: "I see very clearly that one may learn from this game what can be learned of war in books; it should be introduced into all military schools." (See Löbell Jahresberichte, No. 1, 1874, p. 721).

Venturini's war game is, in its main features, a reproduction of Helwig's invention; but the rules concerning the

* December 30, 1803. † March 6, 1804. ‡ February 9, 1804.

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conduct of operations, summed up in the work of Von der Goltz (Rosbach et Iéna), merit quotation:

"The war begins on the edges of the sheet; each side receives a number of pawns equal to half the number of squares on the board. The pawns are brigades, two-thirds of the pawns representing infantry, one-third cavalry. There is one field battery for two brigades of infantry, and one horse battery for three brigades of cavalry.

"Siege batteries, convoys, provision wagons, and bakeries are distributed in certain proportions which, however, are not those governed by war conditions.

"Footbridges, scaling ladders, rows of fascines, earth parapets, passageways, and magazines are represented by an endless quantity of pawns of different sizes.

"The war is divided into expeditions, each expedition comprising forty-eight operations at the rate of four for twelve months.

"In cities, however large they may be, there may be stationed only half as many pawns as in the fortresses.

"In open country, movements in winter may be made only under certain conditions. If a movement requires three days in January or February, it is considered half lost.

"Supplies and rations are represented, carried along, or consumed; communication with the base of supplies must always be maintained. If a column finds itself in a city, the bakers of the city supply it with bread. A brigade column has no right to carry anything away. In a market town or village square, bakers are not required to bake in any one day more than enough bread for a brigade."

Rules without end are fixed for the moving and fighting of a column.

General Von der Goltz concludes thus: "The whole resembles very closely the game of '*poste et de voyage*' in vogue a few years ago, where, upon making an unlucky throw of the dice, one tumbles into a swamp, or breaks an axletree, or experiences some other such mishap. Assuming a beginner in the study of the science of commanding an army, Venturini hopes thus to render clear his confused and perplexed ideas on the progress, the correlation, the origin, and the results of great operations.

"This war game is a bad product of the refined military education of the period, which had piled up so many difficulties that it was incapable of taking a step in advance."

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The games of Helwig and Venturini bear a strong resemblance to each other, and represent the type of war game which, at that epoch, all inventors of analogous systems adopted with more or less modification.

But one of them, Giacommetti, a Genoese lawyer, in 1801, dedicated to Napoleon Bonaparte a new war game of quite a different character.

The battlefield is represented by a chessboard, with 152 divisions, alternately black and white, and divided into two parts by a river 9 divisions long and 1 division wide.

Within the first two lines of divisions is constructed a fortress of nine bastions and a citadel, to capture which is the player's object.

The armies are composed as follows:

For the defender.—One general stationed in the fortress, 2 foot soldiers, 2 cannon, and 1 mortar;

For the assailant.—One general in chief, 1 lieutenant general, 2 generals, 1 general of cavalry, 4 cavalrymen, 8 foot soldiers, 2 cannon, and 1 mortar.

Each party has, besides, 8 trenches, 4 bridges, and 4 ladders.

Disposition of all the pieces having been made, the game begins and the sides move pieces alternately.

The foot soldiers march in all directions, two steps forward and one step to the right or left or to the rear; but they can not cross a division swept by the fire of a hostile foot soldier or of a superior piece; they may attack a piece which opposes them on condition only that this one may be counter attacked by another piece. * * *

The cannon and mortars fire without moving, the latter delivering high angle fire. Cannon fire is made effective a distance of 4 divisions of the board, but it can have only one objective. One may make use of a cannon captured from his adversary; but if it be impossible to take it away, it must be either spiked or thrown into the river. * * *

Special rules bear upon the passage of the river, the establishment and defense of trenches, the attack of the fortress by means of approaches with a view to breaching, the employment of scaling ladders, etc. * * *

Finally, prisoners may be exchanged, and provision is made whereby a pawn for performing an act of special bravery may be advanced in grade. The private becomes a general, then lieutenant general, etc. * * *

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These first attempts need no commentary, but the idea which they embody stands out boldly against this background of balderdash, and under an altogether new form will reveal the advantages that may be drawn from its more rational application.

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SECOND PERIOD.—THE WAR GAME.

The rules and methods of procedure, which First Lieutenant von Reisswitz published in 1824, remained the fundamental type of war game until 1875.

Although at the beginning of the second period the war game presented itself under an entirely new form, altogether different from that of the chess war game, the influence of the latter was still powerful enough to attach to the new game special and well-defined rules of play, and to preserve the name of game.

Its transformation, however, was radical; for the different colored squares representing the terrain was substituted a map; and, in place of conventional figures indicating the different arms of the service, use was made of pawns representing organic subdivisions and constructed to the scale of the map used, viz, $\frac{1}{8000}$.

A strong imagination and much labor were needed to codify a set of rules capable of meeting all requirements of the special cases which a military operation might present, and to present as close a resemblance to combat as possible.

It is to Lieutenant von Reisswitz that all the honor of this codification reverts, while the transformation of the game itself was the work of his father, counsellor of the War Department and of the public administration at Breslau.

The *Militär Wochenblatt* of September 9, 1874, in an article said to have been inspired by high authority, relates as follows how M. Reisswitz's war game became known at the Prussian Court and the favorable reception there accorded it:

"In 1811, von Reiche, a captain of the corps of cadets at Berlin, was giving lessons in fortification to Prince William (later King William I.) and to Prince Frederick. One day he spoke to them of the new war game and advised them to study it, though its inventor, M. Reisswitz, did not belong to the army. At the desire of the princes, their tutor, Colonel von Pirch II.,

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had the war game installed in the castle at Berlin. The terrain on a scale of $\frac{1}{2^3 7^3}$ was modeled in sand; the troops appeared as squares of wood upon which conventional signs had been pasted. The game quickly interested the two young princes, and, struck with the advantages which it presented, Colonel von Pirch authorized them to speak of it to King Frederick William III. The latter expressed a desire that the game be shown him, but M. Reisswitz declared that he never dare present a box filled with sand to His Majesty, and asked for a little time in which to represent the terrain in some more satisfactory manner.

"The King had almost forgotten the incident when, the following year (1812), M. Reisswitz's war game was presented to him in its new form. The terrain was modeled in plaster, in relief, and woods, villages, roads, and water courses were represented in colors, and little porcelain cubes represented the troops. The entire arrangement was made with special care, and it greatly pleased the King, who had it taken to Potsdam. Matches were organized which were very successful, and the signal favor bestowed upon it by the King exercised a happy influence on the future of the game. Later, in 1816, when the Grand Duke Nicholas came to Potsdam, the King spoke to him enthusiastically of the new invention; matches were got up in honor of the Grand Duke, who gave himself up to it with extraordinary ardor; and the following year, when Prince William visited the Court of Russia, a war game was improvised at Moscow by joining several card tables together and tracing the terrain thereon with chalk."

During this time, Lieutenant von Reisswitz eagerly pursued the task of drawing up rules for the game and endeavored to popularize it among his companions. Already, in 1816, at Stettin, where the Second Brigade of Artillery was stationed, several matches had taken place; and it was proved to answer just as well for the study of a battalion in action as for the operations of several army corps.

In 1819, Von Reisswitz was transferred to Berlin, to the Second Regiment of Foot Artillery of the Guard, and his ideas were shared by several officers who diligently applied themselves to the war game. They met at least once each week; the number of adherents increased, and it was then possible, thanks to the cooperation of all, to experiment thoroughly and to improve the rules which had been used. The one thing which

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did not satisfy Von Reisswitz was the word "game;" but not finding anything to take its place he retained it.

In January or February, 1824, the Prince Royal, then commandant of the III. Army Corps, heard this war game spoken of and invited Lieutenant von Reisswitz to explain it to him. The latter hastened to accede to the request and obtained authority for several officers well acquainted with the rules of the game to accompany him. After a very short lecture they played a match in which the Prince took part, and he was so keenly interested that he promised to speak of it to the King and to the chief of the general staff, Lieutenant General von Müffling.

Reisswitz then decided to publish his brochure, which bears the title "Instruction pour la représentation de manœuvres tactiques avec l'appareil du Jeu de la guerre."

A few days afterwards he was summoned to wait upon General von Müffling. Accompanied by the same officers who had gone with him to the Prince Royal, he called upon General von Müffling and found him surrounded by his staff officers. When Reisswitz entered, the General, addressing the latter, said: "Gentlemen, here is Lieutenant Reisswitz, who comes to show us something new." Without allowing this somewhat cool welcome to affect him, Reisswitz began by unfolding his maps. In great astonishment the General exclaimed: "Why! is your game played on real maps instead of a chessboard? Let's see, can you represent anything like the assembly formation of a division with your pawns?"

"I pray your Excellency," replied Reisswitz, "to state the general hypothesis and the theme of a maneuver to be executed on this map, and to designate two of your officers to exercise the functions of leaders. The only condition I impose is that each particular theme may contain only such information of the adversary as may conform to reality." General Müffling after a few moments' reflection did as requested. Each leader was joined by one of the officers familiar with the game, who had accompanied Reisswitz, and at the conclusion of the match the chief of staff exclaimed: "Why, this is not a game, it is a veritable war school! It is my duty to recommend it to the whole army."

He kept his word, and the *Militär Wochenblatt*, No. 102, of March 6, 1824, published the following note: "For a long time efforts have been made to represent the operations of war in

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an interesting manner that should at the same time permit of discussion and instruction, and the different productions have been designated war games. But these games presented great difficulties of execution and bore no resemblance to the operations of war.

"It is somewhat astonishing, however, that these efforts should have been made by persons not connected with the army, which explains why they have not been able to imagine combinations which would occur in military operations, and for that reason their work could not satisfy experienced officers.

"Finally, an officer busied himself several years seeking to perfect these plans; he has completed and simplified an idea originating with his father, Counsellor von Reisswitz, and he has succeeded in representing with simplicity and reality the combinations of war.

"Whoever understands the art of war can, in this game, fulfill the functions of a commander of troops in greater or less bodies, even if he does not know the conventions adopted and has never seen the game played.

"By practicing on good maps, representing a real terrain, and changing them, it becomes the more instructive, because it permits of a variation in the dispositions to be made and the orders to be given.

"I shall endeavor by all means at my disposal to increase the number of maps now existing.

"Although Lieutenant Reisswitz has already been rewarded for his work by the approbation and encouragement which have been accorded him by the princes of the royal house, the minister of war, and officers of high rank, who have become acquainted with his war game, he will receive besides the thanks of the entire army when his invention shall have become known and appreciated by all.

"VON MÜFFLING.

"BERLIN, *February 25, 1824.*"

It would be difficult to praise the war game in warmer terms, and the year 1824 may be fixed as the date of its real invention and introduction into the Prussian army. By a cabinet order the King directed that each regiment be supplied with one of these war games, and Lieutenant Reisswitz was kept constantly engaged in superintending the manufacture and publication of new maps to the scale of $\frac{1}{8000}$.

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Before giving a sketch of the rules of the game we shall conclude the biography of Reisswitz by summarizing an article which appeared in the *Militär Wochenblatt*, No. 56, 1874. It is from the pen of General of Infantry z. D. Dannhauer, who was very much attached to him and took part in his work under circumstances that have already been mentioned.

The Grand Duke Nicholas of Russia, having received some details of Reisswitz's invention through Prince William, expressed a desire to have Reisswitz come to St. Petersburg in order to learn the game from him. He was admirably received there, had the honor of being presented to the Emperor Alexander, and occupied a prominent position at court, where he remained during the entire summer, returning to Berlin in the autumn with the Grand Duke Nicholas, who went there to pass the winter. A war game was then organized, with the Grand Duke and the Prince Royal as leaders, and the country between the Elbe and Oder for the field of operations, contemplating a decisive battle at Bautzen. The theme was formulated by General von Müffling, who, with the assistance of Reisswitz, acted as director or umpire. The matches took place once or twice a week, and frequently the King and princes attended them as well as the generals and colonels of the Berlin garrison.

The example set by such high authority was immediately followed. At Berlin, the Artillery Brigade and the Second Regiment of Foot Artillery of the Guard formed societies to play the game, and many officers of other regiments and of the war school came to take part in it. The latter introduced the war game into the country garrisons.

Field Marshal von Moltke, then (1828) a lieutenant, was an industrious player, and later, as chief of staff of the IV. Corps, at Magdeburg, he exerted his full effort to promote the war game, which he considered the best means of spreading and perfecting instruction among the officers.

In 1825 Marshal Marmont visited Moscow as an envoy extraordinary at the coronation of the Czar Nicholas. He stopped a few days in Berlin with his brother-in-law, Count de Saint-Priest, the French ambassador. Expressing a wish to see the game played, he was present at a match and was enthusiastic over it, declaring that it was the happiest invention of the period and that he desired to introduce it in the French army.*

* A manuscript translation of Reisswitz's work was submitted to a committee of the French general staff in March, 1829.

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General Dannhauer having thus shown the high esteem in which Reisswitz's invention was held both at court and in upper army circles, adds: "One might believe that this game, which has so much intrinsic value, which was so thoroughly approved, and was publicly presented under such favorable auspices, would have met with a hearty welcome everywhere. But it was not so. It immediately encountered strong opposition from those who claimed that practicing the war game would necessarily injure the young officers. 'If you make them conduct brigades and divisions,' they said, 'they will get an exaggerated idea of their ability as generalissimos and will consider the details of company duty very much beneath them.'

"It is not necessary to refute such an assertion.

"All the incumbents of our high commands played the war game when they were lieutenants, and no one can assert that it increased their pride, nor charge them with not strictly fulfilling all their duties as company officers. *But the fact which deserves particular attention is that by its practice when they were lieutenants, they acquired studious and industrious habits which they have retained—habits essential and indispensable to those invested with high command.*"

But Reisswitz became a target for all the discontented and envious, and every possible means was employed to injure him in the eyes of his superiors. His liberal and upright character, his lively, impulsive nature and buoyant spirits excited remarks and criticisms which, instead of being considered simply as whims of no importance, were reported with exaggerations and elaborations to his superiors. They even went so far as to accuse him of intemperance, a fault which he never had.

To be brief, he was appointed captain in 1826, but instead of being assigned to the artillery or the guard he was sent to the Third Brigade of Artillery at Torgau. Looking upon this as a disgrace, he took himself to be completely ruined and committed suicide in 1827.

If his work was not perfect, it contained, nevertheless, a correct and practical idea; and, consequently, it has survived.

We shall now examine, in a general way, this first form of war game, following the directions of Lieutenant Reisswitz.

The war game is the representation on a map, of a maneuver of a battle, with the aid of pawns denoting the different arms of the service and subdivisions of troops employed.

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The map should be on a large scale, so as to admit of the representation of the smallest accidents of the terrain, with a view to their use during the battle; the scale adopted is $\frac{1}{8000}$.

The pawns, which represent the troops, are little squares of lead, painted red for one side or party, and blue for the other. They are made to the same scale as that of the map used, and the conventional signs they bear represent the different arms of the service and indicate the numerical strength of the organic subdivisions.

The necessary outfit comprises dice, dividers, and scales of distances and ranges.

The number of players varies with the number of the subordinates attached to each side, but the minimum is three—two leaders for the sides and an umpire.

The decisions of the umpire are final, and must be immediately carried out. The umpire's action must not be questioned during the course of the game, and neither objection nor discussion is permitted until after the conclusion.

The umpire should see to it that the troops are moved in accord with the spirit of the orders and drill regulations for each arm, so that the players shall become familiar with them and appreciate the time necessary for the various evolutions. He must be apprised of all intended secret marches, concealed movements, ambuscades, etc., in order that he may be able to control their execution and avoid all improbable situations. He requires the players to maintain silence; all orders, reports, and information should pass through and be transmitted by him at the desired time, to the parties addressed. He is also charged with communicating to each leader such information as in his judgment is supposed to come from patrols and other sources.

An important factor in every action is the estimation of the time necessary for its different phases. To attain this result, and provide means for controlling the duration of movements of troops, and to estimate the losses sustained on both sides, the time during which an action develops is divided into rounds (*zug*) of an invariable duration of two minutes each. It is therefore necessary to distinguish between the real hour and the imaginary hour, or hour of battle resulting from the number of rounds elapsed; these evidently differ, for to study a round requires perhaps five or ten minutes of actual time.

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Before assembling the players around the detail map to be used, the umpire sends or gives to the leaders a general hypothesis and special themes. The general hypothesis contains all the information which each of the leaders ought to receive as to the projected operation and the general situation, and should be such as to bring about the contact of the troops on the terrain embraced by the map. The special themes derived from this hypothesis are given only to the leader of the interested party, and contain information concerning the strength and composition of his force and its mission, besides such knowledge as in reality he would be able to possess concerning the enemy.

The leaders will always act according to the spirit of their orders and avoid construing them literally.

During the progress of the match the players will be careful to make the best possible use of their troops under all circumstances. They must become familiar with the functions of each arm, and the dispositions they make will be a test of their knowledge. The evolutions on the map should be the same as would be executed on the terrain under similar conditions; in the presence of the enemy the simplest and most rapid maneuvers are always the best; *complicated movements are excluded from the war game, as they ought to be from the drill ground.*

Having received the general hypothesis and his special theme, each leader prepares his written orders and delivers them to the umpire. From information they contain the umpire is enabled to establish the initial situation of the maneuver, which then begins on the war game map. Only the troops actually visible at this moment are represented on the map. Detachments, patrols, etc., are represented only as they become visible to the enemy or to his reconnaissances. In the latter case, account must be taken of the time required for information gained to be transmitted to the leader, whose position on the map should always be indicated, and pawns representing troops thus discovered should not be put in position until this time has elapsed. The same provision is applicable to the transmission of orders, and a commander can not communicate orally with subordinates who are more than 1,000 paces from him. When a leader changes position, the time necessary for the change is likewise considered.

The original disposition once established, should the umpire see that the contending parties are still too widely separated

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to permit of an engagement, he directs several movements to be made simultaneously; thereafter, the troops once engaged, the game proceeds regularly, round by round. Each side causes its troops to execute such movements as are possible during the round of two minutes; then the umpire determines by means of dice the total losses, which he registers separately for each side. In order to render the losses apparent, pawns belonging to each player are withdrawn, and others of less value are substituted, according to established rules.

The game proceeds thus until a positive result is obtained or until the umpire sees fit to stop the match. In the war game, the author adds, it is not a question of winning or losing, as in cards or chess; this would not be an imitation of the operations of war; the well-grounded decisions of the umpire and the approbation of one's comrades are the only possible rewards. Whoever best follows up his movements, adopts the simplest and most natural means to the end, and departs the least from the general idea of the operation, will have won the match, even though he may have lost a few more pawns than his adversary.

Provided two or three officers of a regiment have taken the trouble carefully to study the rules, play may begin immediately; the others will learn the rules by merely observing the game.

The best way to learn the game is by commencing with simple subjects, as by placing a few pawns on the map and, on nearly level ground, executing movements to familiarize one's self with the rules, gait, distances, and intervals maintained by the troops of all arms; the study of defensive and offensive positions, points favorable for crossing water courses, etc.

After having thus executed minor movements without the enemy being represented, practice with both sides represented may be had.

This preliminary work has for its object to familiarize the players with the use of the pawns, acquaint them with the theory of minor maneuvers on uneven ground against an enemy of superior force, and to give them practice in the drawing up and wording of orders.

If this progressive system is not followed, if one desires to plunge without preparation into the great operations of war, the risk of becoming totally confused is incurred, and much more time will be required to learn the rules of the game. It

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is only after these first exercises and when one has become familiar with the procedure of the game that it will be advisable to divide it into rounds. If, on the other hand, the principles indicated are followed, officers who diligently study the game will not be slow in obtaining good results, the value of which will be quickly apparent in the regiments. The least of the advantages they will derive from it will be to acquire skill in reading maps, in the rational selection of movements best suited to the different arms of the service, in the choice of positions, etc. The interesting discussions which are sure to follow a match will be of incontestable value in the study of the military art.

It can not be denied that the war game, always interesting, will be more or less instructive and profitable, according as the umpire is more or less capable of making it progress regularly and conformably to the true principles of the art of war. His duties appear difficult and complicated; however, there are but few officers, who, with the necessary instruction, and a judgment never so little exercised, may not be able to identify themselves with and successfully fill this rôle.

A thorough grasp of the umpire's duties, and success in overcoming their inherent difficulties, will encourage officers to take this part as often as possible, for the game offers many opportunities of increasing one's information, of developing one's intelligence, and of exercising one's self in the comparison and estimation of other people's ideas.

Such are the principles of the war game invented by Lieutenant Reisswitz and his father. We shall by and by give attention to the other rules which they made use of in playing it; but before doing so, it is proper to point out the radical modifications made by them in the game, as practiced up to that time.

For the chessboard is substituted a map representing a real terrain, and the chess pawns, as well as their conventional movements, are set aside. Troops are represented by small leaden cubes which, constructed to the scale of the map, represent as exactly as possible the organic subdivisions of a regiment; and the only rules governing their movements are those which would actually apply to the troops themselves whether on the march or in action; and the end proposed is the solution of a well-defined tactical operation, under the surveillance and assistance of a director who is also judge and umpire.

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It is a true object lesson in tactical instruction; it offers all the advantages of the study of a concrete case, requiring, on the part of those who engage in it, reflection, search of the means to attain a desired end, and a tenacity of purpose notwithstanding the active and constant opposition of the adversary.

The precepts relating to the orders to be given by the director, and the means set forth for the valuation of time necessary for the transmission of orders and information, are perfectly applicable to-day. We have the greatest admiration for the ingenuity and real talent displayed by the inventors in disentangling the war game from its original form by relieving it of conventionality, and in substituting for a game of chess masquerading as a war game, an exercise of real value when viewed from a tactical standpoint.

But this transformation, notwithstanding all its merits, is not perfect. If there be no fault to find with the first part of the instruction, the same can not be said of the second, which gives the detailed rules of execution. These rules are numerous and in too much detail, and confine the game within such narrow limits that they proscribe all freedom of action, requiring it to proceed, step by step, according to a series of rules, the application of which demands very long preparation on the part of the umpire; and they have the capital fault of not permitting him to base his decision upon his own tactical knowledge; but, instead, require him to use dice with their various combinations to decide the results of every action, every attack, and to determine the losses sustained by the troops engaged.

We shall not present an analysis of all the combinations nor of the rules which apply to them, for it would not be interesting; but we shall briefly indicate the principles upon which they rest.

In every action one of the parties appears to have a greater or less advantage over his adversary; the dice, which are used arbitrarily to adjust differences, are of two classes, favorable or unfavorable to the one using them, and according as they are used under the one or the other hypothesis, the result is more or less affected and the corresponding losses more or less severe.

There are seven dice, bearing on their faces special marks which permit the determination, among other things, of the

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success or failure of an attack; if the latter, whether the assailant is simply forced to beat a retreat or is more or less routed; and, finally, the number of points or losses suffered by each adversary. The total of such losses for each party is then converted into real losses as follows: 25 points represent the loss of two pieces of artillery, 60 that of a squadron of cavalry, 90 of half a battalion of infantry, and 30 of a company of skirmishers.

Finally, numerous precepts are given to govern the use of troops of all arms under all circumstances of combat, even in night attacks, which seems like carrying it too far.

We shall here close this enumeration, for, without further detail, it is easily seen that it is the second part of Reisswitz's instructions which is the more subject to criticism. Certainly there were great difficulties to overcome, but to leave everything to chance, to a throw of dice, was not a happy solution. By not permitting the umpire to be guided by tactical considerations in making his decisions, the game was placed on the same level with an ordinary game of chance, where a single unlucky throw of the dice would cause the failure of a combination carefully prepared according to tactical rules.

Another very important point which narrowed the scope of the war game was the difficult functions of the umpire. To enter upon them it required not only a familiarity with all arms of the service and a knowledge of the mechanism of the game, but, above all, so thorough an acquaintance with all the complicated rules as to apply them without hesitation or error in cases as varied as would arise in war. Their study required a great deal of arduous work, which did not suit all those who should have possessed the qualifications of an umpire. He is, in reality, the soul of the game, and interest in it depends upon him so absolutely that many officers who had enthusiastically adopted Reisswitz's ideas quickly became discouraged, because the poorly directed matches dragged their weary length along without profit to anybody. Nevertheless, the war game had taken a rational form, suited to the end in view; all the modifications to which it was subjected applied to the rules and points of detail, but the execution itself remained as Reisswitz originally conceived it.

During the years following the publication of Reisswitz's work, and while he remained in Berlin, the war game made rapid strides. As we have stated, an order of the King

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recommended the purchase of the apparatus to all bodies of officers; but the removal of Reisswitz to Torgau and his unfortunate end, in 1827, were detrimental to the progress of his invention.

It is only since 1860 that the war game has spread generally among officers. Up to that time it had been practiced only in clubs specially organized for the purpose in a few large garrisons. Among them the Magdeburg Club, which was so brilliantly managed by General von Moltke, ranked first. Only a few bodies of officers can boast of always having been adepts at the war game; but amongst them mention must be made of the officers of the Artillery of the Guard, to which the inventor belonged. Talented writers, convinced of the game's utility, continued, however, to give it attention, and foremost among them are Decker and Witzleben, who published instructions and new rules for its conduct. Then, in 1846, the Berlin War Game Club brought out the "Instruction pour la représentation des opérations militaires à l'aide de l'appareil du Jeu de la guerre." This work went through a second edition in 1855. Its authors remarked that, by reason of the revision and augmentation of the rules, it was possible to consider a greater number and variation of cases; the game represented more nearly the characteristics of battle. There was, therefore, a tendency to eliminate improbabilities. Rules relating to the estimation of the effects of fire were completed, assumed a greater importance, and were rendered more practical.

But if these modifications introduced certain improvements they at the same time produced other inconveniences; the rules became still more numerous and complicated, and a study of them and the practice of the game more difficult.

This work was the standard until 1862, when von Tschischwitz published a "Nouvelle Instruction pour le Jeu de la guerre;" he preserved the primitive method of Reisswitz, but adopted less complicated and more practical rules for computing losses. After a long period of peace, Germany had two wars which allowed all officers to become convinced of the necessity of familiarizing themselves with the operations of war. Consequently, after each of the campaigns of 1866 and 1870, there appeared a strong sentiment in favor of the war game, and in 1874–75 Lieutenant von Reisswitz's invention attained its complete development.

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From 1862 to 1869 Captain von Tschischwitz's book of instructions passed through three editions; in 1869 there appeared a treatise by Colonel z. D. von Trotha, and this too passed through three editions. The latter revised the original rules with a view of giving a more exact representation of battle and of relieving the development of the game of the incumbrances which operated to narrow its scope. But this was simply to turn in a syllogistic circle, for, in seeking to prescribe definite rules for studying battle and rendering decisions in an infinite variety of cases, he unavoidably committed the error of his predecessors by constantly adding to the rules.

In 1872 the war game received a great impetus; and, as it was largely played, a great many umpires were required. Certainly there was no lack of officers capable of this function, but there were few with sufficient courage to study and assimilate the complicated rules governing the game. So a compromise was effected, whereby at first only a portion of the rules were preserved; in the end they were completely set aside and the management of the game came to rest entirely upon the extended tactical experience which the umpires had acquired in war. The result was that, while the absolute utility of the war game was recognized by everybody, a feeling existed that it would have to be greatly modified by stripping it of everything which smacked of a game, as the term is generally used—that is to say, by doing away with all decisions based on chance, and by preserving rules, or rather conventions, only for a general representation of the battle and by basing all decisions solely on tactical considerations.

This was the beginning of the third period. Before examining it, we ought to add a few historical details of the second period. Until now, we have considered the war game in its general features only as regards operations leading to battle and the battle itself. But an attempt had also been made to utilize it for operations absolutely special in character: the study of siege warfare.

A short time after the war of 1870–71, under the inspiration of the Prussian general inspector of artillery, von Hindersin, there appeared a complete war-game apparatus to represent attack and defense of fortified places. A little later, in 1872, there appeared "Directives pour le Jeu de la guerre de

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forteresse," by Major Neumann. This instruction, as the title indicates, contained no rules, but was based upon purely tactical and technical data, permitting the fullest liberty of direction. It was received with great favor by the officers of artillery and engineers, and the general inspectors of these two corps extolled the study of it.

This special war game was studied with equal zeal in Austria. In 1874 an artillery and engineering review gave some details of Alph. Makowiczka's war game as applied to fortified places. Furthermore, it was in Austria that the game was received with the heartiest welcome. As far back as 1847 an article in the *Militärische Zeitschrift* had set forth all of its advantages; but it did not really spread throughout the army until 1866, when the methods in vogue in the German army were used.

After 1870 the game began to occupy attention in Switzerland and Italy. In Russia Captain Skougarefski's manual appeared in 1875 (see *Revue Militaire de l'Etranger* of 1875, Vol. VIII, page 270). The same publication had given an analysis of Colonel von Trotha's war game in the first half-yearly volume of 1872; and in the first of 1873 (Vol. VIII, page 57), a study of the instructions for maneuvering on the map ("Manœuvre sur la Carte," *) published by the commanding authority of the Italian Staff Corps; the instruction greatly resembled that of Colonel von Trotha.

Finally, in 1874, the Réunion des Officiers published a war game which gave an exact idea of the methods employed at that epoch. This was the first effort of the kind that had been made in France.

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THIRD PERIOD.—COMPETITIVE MAP MANEUVERS.

We now reach the last transformation of the war game. A radical transformation it was, too, for its object was completely to suppress all the minute and complicated rules which the umpire had to consider in rendering his decisions, and to substitute for them full liberty of action: that is to say, a liberty based solely upon tactical considerations.

*Official name given to the war game in Italy.

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This evolution is characterized, in Germany, by the following works of Lieutenant Meckel, a professor in the war school at Hanover:

Études sur le Jeu de la guerre, published in 1873;

Instruction pour le Jeu de la guerre, 1875;

and also by the brochure by Colonel von Verdy du Vernois, chief of staff of the I. Army Corps, which appeared in 1876 under the title of *Études Complémentaires sur le Jeu de la guerre.*

In his works Lieutenant, since Captain, Meckel echoed new tendencies; he understood the need of a complete change in the methods of playing the game, but as yet he had not the courage to attempt an open rupture with what were then the accepted principles. The central idea of his instructions, remarkable in many ways, was to emancipate the umpire from all rules; but, as on the other hand, it imposed upon him the necessity, above all, of taking into account the losses by fire in his decisions, so it still preserved a set of rules for estimating them, and the dice and tables of losses.

The work of Colonel von Verdy du Vernois cut loose entirely from the past; he accepted neither rule nor table. "The war game," said he, "should be conducted on the same principles as staff journeys, for the military results sought by the two exercises are identical. Now, in staff journeys nobody ever had an idea of deciding the success of an operation by the throw of dice; the umpire made his decision from his own standpoint, and it should be the same in the war game."

The appearance of these works has produced a new evolution of the war game, and we shall consider them successively.

MECKEL'S IDEAS ON THE WAR GAME.

Meckel's "Étude sur le Jeu de la Guerre" began by showing the great usefulness of the exercise in the instruction of officers charged with leading troops. The first part is a very fair and spirited plea in its favor. It is addressed, though the author carefully avoids saying so directly, not only to its opponents, but to indifferent persons, who are the worst enemies of all progress, of all work, for they reject deliberately and without previous examination every idea which tends to arouse them from their stupor or lift them out of the routine into which they have fallen.

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Meckel justly praises the intellectual movement in the German army—note the fact that he wrote in 1873—but observes that such a movement ought to be skillfully guided along a new path. Up to that time theoretical studies, and those of military philosophy as set forth in the writings of Clausewitz, had been in special favor, and all the more because they were particularly suited to the German habits of mind. But the great events which had just happened proved that the study of purely theoretical manuals was not sufficient for officers whose instruction demanded practical means for its development, and that the only means was to study concrete cases, drawn from the experiences of war, as set forth by Colonel von Verdy du Vernois in his *Étude sur la conduite des troupes.*

This method gives the best results, for it concentrates the mind on a single well-defined case, and brings into requisition for the solution of a tactical problem all the knowledge an officer has acquired in his theoretical studies. It is at the present time in use throughout the German army. Its employment in connection with field exercises, grand maneuvers, and staff journeys assures the practical instruction of the officer under the most favorable conditions; but there is one faculty which it can only rarely develop within him, and that is the spirit of the initiative and of prompt decision.

Officers who during maneuvers command large units, as well as staff officers, have, it is true, opportunities of developing that quality; but the others, and they form the great majority, never have a chance to exercise functions higher than those of their grade, to have separate command, and hence, to train themselves in the forming and executing of prompt decisions.

There is only one means to supply the deficiency, and that is to practice the war game.

Still we must recognize the fact that those who have most to gain from it—officers of the line—are precisely the ones who display the greatest opposition to this sort of study.

It is recognized that its practice presented only a limited attraction as long as it was characterized by the metaphysical military ideas of the century, and by the fact that its management, such as it has been in the past, presented an obstacle to its development. But during the fifty years it has been in existence it has been much improved, and when the task of

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the umpire shall have been simplified by removing the restraints of useless and even harmful rules, the war game will become the foundation itself of the instruction of officers.

Permit us to point out the principal advantages among the many it possesses.

First.—It presents all the usefulness of an object lesson; for the troops, being really represented to scale, can be followed in all their movements in their march toward the enemy and in battle; even the use of the ground may be taken into account, and the service of one arm or the combined action of the three arms is faithfully represented. Moreover, the officer, who during the maneuvers generally has only a very limited horizon, frequently confined to the unit of troops he commands, may gain an excellent idea of the ensemble of a battle and of the different phases which characterize it; and it is not one of its least advantages, testified to by many well-informed officers, that practice of the war game facilitates their tactical studies and especially the study of military history, for they acquire the habit of rapidly comprehending the course of a battle in all its essential features, while formerly they succeeded only with difficulty in grasping the ensemble, and then not clearly.

Second.—It constitutes a constant exercise in the conception and wording of orders. Nothing is more difficult than to give an order; nothing more important than to word it properly. If an order admits of misinterpretation, one may be sure that it will be misinterpreted. Orders too much in detail destroy the initiative of subordinates and prevent them from making dispositions suited to the situation and the intention of the enemy. Orders too general in their nature, and without any indication of a well-defined purpose, are not sufficient to stimulate an overcautious, hesitating junior; and they might lead an enterprising character to act separately and not in harmony with the main object of the operation. Orders that are not precise will not be executed with precision, and an order that is too long will stifle interest.

Every error, every mistake in the wording of an order, leads to waste of effort and sometimes even to useless sacrifice of life. Nothing but long experience in wording orders will prevent these errors, and nothing gives this experience so well as practicing the war game, provided that we take into account the exact time required for the transmission of orders, that

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all information pass through the intermediary of the umpire, and that all conversation between the leaders and their subordinates be strictly forbidden. Finally, it teaches (and this is an essential point, too) how to adapt orders to the character and ability of the officer for whom they are intended. The form adopted to excite and stimulate an indifferent subordinate would not answer for an ardent audacious spirit which it might be necessary to hold in check to avoid an excess of zeal. To an energetic and well-balanced commander it will suffice to point out the desired end, while to a hesitating character must be given more detailed and precise instructions.

Third.—In order that they be well executed, it does not suffice that orders be well given, they must also be well understood. This double result will be reached only by constant practice; the junior will learn to grasp his superior's idea from a word; he will learn to divine it when, as often happens in the critical situations of war, a commander can only express it in a manner somewhat imperfect or vague. The junior will learn likewise the habit of conforming to the will of his superior, in the sense that, although he may appreciate a tactical situation from an exactly opposite standpoint and consequently see a different means to overcome its difficulties, he still makes the ideas of his superior his own, just as if they had proceeded from himself, and carries them out with ardor and fidelity.

Fourth.—Very often in the field the commander will arrive at his conclusions by studying the map. In the preparation for marches, or the disposition of a system of outposts, a complete preliminary reconnaissance is out of the question. The main outlines are based on the knowledge gained from the maps available; and, in this point of view, the war game is a useful and instructive exercise.

Fifth.—From a tactical standpoint there is nothing known which can replace it; it presents even certain advantages over field maneuvers.

Every person possesses to a greater or less degree the faculty of making a prompt decision and carrying it through to conclusion; but, in order to make a proper decision, it is necessary to have knowledge and to be conscious of that knowledge. Knowledge does not consist simply in *acquiring facts*, but rather in the *utilization* of them; the first is accomplished by study, but practice alone secures the second qualification; the

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war game supplies the means of acquiring and perfecting them. With the exception of maneuvers, it is the only exercise in which a commanding officer has only an imperfect knowledge of the enemy upon which to base his judgment, and sometimes he is not even possessed of that knowledge. Let us bear in mind there is no such word as "certain" in a campaign; there will be nothing but very imperfect information concerning the enemy, and it will be necessary to act entirely upon probabilities. Nothing but constant practice will accustom one to the difficulties of a situation; and, in war, where a commander finds himself face to face with the unknown, the gravest fault with which he can be reproached is indecision; therefore he must acquire confidence in himself by solving problems simulating war conditions, in order that he may act with that knowledge and will power necessary to avoid being overawed by the will of his adversary.

When it is well managed, the war game is capable of giving the most exact representation of what will occur in a campaign. If each leader has received only the most indispensable information concerning the enemy, and if, moreover, in the progress of the match care be exercised by the two sides to place upon the map only the troops really visible, this exercise becomes even superior to maneuvers. The unknown in it is really more of a factor than in the latter, for in these one always knows, at least very nearly, the strength of the adversary, either through the list of troops engaged in them, or by the cantonments occupied, or, above all, by means of orders which must be issued to modify the initial situation and which always become matters of public information.

But it does not suffice for a commander merely to make a decision—it is further necessary in every operation of war that he pursue it to the very end if decisive results are desired; and this qualification is very difficult to acquire, for as soon as contact with the enemy is gained, he finds himself confronted with a will opposed to his own.

In such a case it is best to persevere in first intentions and so far from being influenced by the menaces of the enemy, on the contrary, the attempt must be made to thwart his will; and it is through tenacity of purpose under such conditions that the object of the battle will be accomplished. To acquire all these qualifications practice is necessary; grand maneuvers do not last long enough, moreover the unknown is almost completely eliminated, and the employment of the war game is the only way to develop them.

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Sixth.—We must not forget, either, that in war the best dispositions may be rendered ineffective by those of the enemy; success is often fickle, fond of chance, of the extraordinary, but it is above all hostile to type dispositions, to fixed rules proceeding from an unintelligent and irrational application of regulations. The study of concrete cases is the only method to be employed in convincing an officer that formulas and schemes are to be mercilessly rejected, that all situations in war are special and exceptional, and that decisions and dispositions suitable to them can be made only by an exercise of judgment and good sense acquired by the diligent study of general principles. Good judgment is acquired by exertion and the rational and intelligent discussion of concrete cases.

Now, the war game offers this considerable advantage—that after it has served as a true object lesson it admits, once the practice finished, of a full discussion of the different phases of a battle, and gives to all, umpires and leaders, an opportunity to exchange their ideas and opinions.

If all discussion be absolutely prohibited during the course of the match, it should, on the contrary, be encouraged in every way after its termination.

The umpire, after having summed up the premises of the operation, points out its salient features, and these only, beginning with the orders by each leader, and gives the reasons for his decisions. Once the match finished, each participant is at liberty to approve or disapprove of them, but in the case of disapproval the reasons therefor should be stated. There follows an interchange of ideas and criticisms which become a general source of instruction, so much the more useful as each participant draws from them lessons suitable to his own mind and temperament. The more these differ the wider the range of discussion, giving rise sometimes to diametrically opposite conclusions.

Suppose, for example, that in the course of a match the umpire decides that an attack has failed. His decision is immediately accepted without the shadow of a protest, but after the match the opinion of a progressive and high-spirited person would be something as follows: The attack ought to have been led more rapidly, time was wasted in maneuvering, waiting for reserves, in preparing the attack by fire action; if the attack had been rigorously pushed at the beginning the enemy would not have had time to make disposition to meet it.

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On the other hand the views of a calm methodical character would be: The attack was premature, the attacking force was too small, and the fire preparation should have been more complete.

So far as these two opinions concern the personality of those who utter them, they are equally exact. Everyone can not draw the same conclusions from or make the same application of theoretical principles; each formulates action agreeably to his individual conceptions. It is for this reason that the discussions which follow a war game match are so interesting; the different and even contrary opinions which are expressed tend to a broadening of thought, shed new light upon the subject, and from this standpoint the game is superior to maneuvers.

In general, what constitutes a criticism following a maneuver? Simply, an officer of high rank gives his opinion, and everybody is obliged to accept it without a word.

Nevertheless it is the discussion that above all is instructive. Objection will be made, perhaps, that the umpires are present to adjudicate *de visu* the different incidents which can arise during a battle; but the umpires can not be everywhere just at the desired moment, and they have not time to give tactical reasons for their decisions.

Seventh.—Finally, the war game is the most effectual means to develop a taste for study. Every officer who practices it will quickly perceive his deficiency of knowledge and set about to remove it. In this manner he will become familiar with organization, tactics, and the method of using different arms; he will become acquainted with the composition and functions of the different arms of the service, with subsistence, convoys, reserve supplies of munitions, etc.; also such special works as construction of bridges, passage of water courses, putting positions and localities in a state of defense, etc.; all of these will become equally familiar to him.

Moreover, the formulating of hypothetical cases and appropriate themes furnishes the officer so engaged ample occasion for very interesting and instructive occupation. This work should not be confined to the umpire; all officers should take it up and serve in that capacity. Lieutenants should give elementary tactical themes to their noncommissioned officers, and if they are faulty in conception or badly worded they either can not be executed or will be useless as a means of instruction.

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The same course should be followed with reference to the criticism. All should be successively detailed for that rôle, and from it the greatest profit will proceed. They will learn to review from memory the general trend of the battle; to seize upon and bring out the salient points, and, above all, school themselves to do it in a manner so tactful as to avoid wounding the most sensitive feelings. Criticism should always be characterized by kindness and good will, and although it is necessary to draw attention to errors committed, equal prominence should be given to points of merit and excellence; otherwise it would destroy the self-confidence of every officer, a quality without which neither decision nor initiative is to be expected.

War-game matches should always be conducted in a spirit of good will and comradeship, and the development of these conditions will be quite as valuable as the instruction imparted; through them the officers will become better acquainted and learn to appreciate one another; true talent will be rapidly brought to light; superficial talents will fail under the test; the timid character, taking confidence in himself, will overcome his hesitation and learn to act; one inclined to self-sufficiency will learn moderation, and, being less sure of himself, will recognize things which he has yet to learn.

Moreover, it gives an officer an opportunity to prepare himself for the functions of a higher grade. In time of peace the lieutenant is occupied only with the affairs of his section. In time he becomes a captain and perhaps will have, in case of war, suddenly to assume the responsibility of commanding a separate battalion, with detachments of other arms. What will he do without having beforehand prepared himself for such a command?

Nothing can take the place of the war game; it even possesses advantages over maneuvers which we have pointed out, and is, to our mind, the best means of instructing officers, especially the young officers of the line; it is instructive, and inculcates a taste for study, which is absolutely indispensable, in proportion to advancement in grade.

In the second part of his work, Meckel asks if the war game is as widely spread as it ought to be.

His negative answer he attributes to the fact that the game presents imperfections calculated to repel many who are inclined to favor it.

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The principal faults observable, he says, are the following:

First.—The decisions of the umpire must conform to a set of fixed rules which almost totally exclude tactical considerations.

Second.—The employment of these rules always produces numerous improbabilities, because they are not adapted to all cases, and every operation of war has its own peculiar features.

Third.—The reckoning of losses by the enemy's fire causes the game to drag along slowly and uninterestingly; and the time required to make calculations is absolutely lost, for these results have only a feeble influence on the decision of the match.

Fourth.—The instructions in their present form have much more to do with the memory than with the tactical knowledge of the umpire. Whoever wishes to fulfill the functions of that position is obliged to learn these instructions, and their complication and multiplicity discourage those with the best intentions.

This last is the gravest defect, for there is a general lack of clever and competent umpires.

We need new instructions for the war game, which will admit of any officer acting as umpire without the aid of special rules and guided entirely by tactical considerations.

But there is one important factor which must henceforth be carefully considered, and that is the estimation of the effects of fire. It is necessary, says Meckel, that at any moment of the combat the director be able to determine the losses sustained by the columns engaged; this is dependent upon many things, such as the favorable or unfavorable position of the firing lines, and the greater or less view had of the enemy; whether the forces are sheltered or exposed, and finally, upon the distance separating the combatants. A determination of losses based upon such factors will serve as a basis for the umpire's decisions, as it will enable him to avoid the incongruities of the past, when tactical considerations were abandoned and the mere turn of the dice served instead to decide whether an infantry column advancing under fire could or could not continue its advance.

By taking the effects of fire as a basis of his estimate, the umpire will have a means of exactly valuing the remaining strength of a column in accordance with the losses it has sustained: the column may still retain its full moral strength,

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even though it experience relatively severe losses, provided those losses extend over a considerable space of time; it may lose all of its enthusiasm and dash if these same losses occur in a few moments. These are important factors to occupy the attention of the umpire after the forces are once engaged; the estimate of fire effect alone will enable him to determine whether any particular column is still capable of advancing, and to decide which side has the resultant advantage.

In the last part of his brochure, Meckel defines the different kinds of war game.

If it be desired to estimate the effects of fire in all its details, it is not necessary to exceed a certain total strength. Until the present time there were allowed, for this purpose, a strength of from three to seven battalions, which are a great deal too many; for, if fire preparation is made with care, if account be taken of present combat formations, almost entirely in dispersed order, the umpire would have to decide on the action and losses of from 20 to 40 sections of skirmishers on each side. For one desiring to do the work with care, this is an absolute impossibility; moreover, it would cause the match to drag wearisomely along, and a single evening would not be sufficient time to consider a battle in its entirety.

Each time a force acts by fire action the umpire should weigh the situation and decide as to its efficacy. The losses should be carefully registered for each company, squadron, or battery, for every command acting independently, whatever be its strength, and in decisive moments it is necessary to calculate the losses even for every $\frac{1}{4}$ or $\frac{1}{2}$ section.

We must break away from the false idea that the study of large bodies is more instructive and interesting in a battle than that of small units. By the employment of the three arms and their combined action, the progress of a battle can be just as well studied with a detachment of one battalion, one squadron, and a few batteries, as with a brigade or division; and, besides, the study of a small detachment is more instructive to the greater part of the officers, for it admits of entering into the smallest details.

A match should never last longer than three hours if it is desired to indulge in an instructive discussion, for this is the extreme limit during which attention and interest can be maintained. The infantry employed should not exceed a

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battalion; as to the proportion of cavalry and artillery, it may be a little greater than above indicated, because the action of these arms does not influence the duration of the game.

If it is not desired to make such a deep study of details, a somewhat greater force may be taken. In the grand war game, the best units to study are comprised between a mixed brigade and a separate division. But it is understood that, in this case, no effort is made to study the effects of fire in detail; their determination will be left to the unrestricted action of the umpire, who will reach very just and exact conclusions if he has had previous experience in directing matches where such details have been minutely studied.

Lastly, the war game can be utilized to study the strategic handling of troops. Up to the present time no rules have been given for the strategical game, which enters the domain of the staff studies taught in the institutions for higher military instruction.

There are, then, three kinds of war game—that of the "regiment" or "detachment," which has for its object the study of details; then the "grand war game," which enlarges the field of operations and which it is useful to alternate with the first; and lastly, the "strategic game," which deals with the general conduct of operations.

Such are, in general, the ideas set forth by Meckel. The appearance of his brochure caused a great flurry among all old partisans of the former method. Colonel von Trotha echoed all the recriminations that it excited, and published an article in which he attacked especially the principles of "independent direction" adopted by Meckel. He tried to prove that if the principle were admitted it would create discontent among all the players obliged to accept the personal ideas of the umpire; that this manner of directing a game was admissible only in the exceptional case where the functions were performed by some one having a universally recognized authority, or at least a capacity absolutely transcendant in the domain of tactics. If this condition were not satisfied, the matches would resolve themselves into idle and fruitless discussions, for the actual force of direction rests not in a personality, but upon a set of impartial rules, applicable alike to the players and the umpire.

But the impetus had been given. Meckel, on the other hand, feeling himself supported by the encouragement of high military authorities, published, in 1875, his "Instructions for the

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war game," containing in Part I the rules for it. Let us note here that Part II, which was to be the application of these rules to concrete cases, never appeared, on account of the publication of the brochure by Colonel von Verdy du Vernois.

Before commencing the study of the instructions, let us recall that Captain Meckel admits two kinds of war game—the strategic game and the tactical game—in which he makes a distinction between the grand war game and that of the regiment or detachment. It is in the last only, adapted to the study of details, that he recommends the study of the effects of fire and the determination of losses for each organic unit.

In his instruction, Meckel commences with a description of the apparatus, and treats first of all of the *Maps*.

MAPS.—Maps of different scales are required for the different war games. That of the detachment is played preferably on a map drawn to a scale of $\frac{1}{62500}$; the scale of $\frac{1}{80000}$, until then used, appeared to him too small to permit a detailed representation of the progress of a battle.

For the grand war game, the scale of $\frac{1}{125000}$ is the best; as to the strategic game, it will be played on the map drawn to a scale of $\frac{1}{100000}$, the German general staff map.

The maps must present a moderately accidented terrain, sufficiently varied, and offering a certain number of features, such as villages, farms, wooded patches, etc. A map which presents a peculiar character, such as an open plain, a vast extent of dense forest, or a mountainous region, is as little suited to the war game as the country represented is to the movement of troops.

The maps, divided into squares of from 30 to 35 centimeters, will be mounted on linen or cardboard. Meckel recommends the use of a table 1.5 meters long by 1 meter wide, supplied with leaves to increase its size if the map used should be larger than that.

But ordinary maps are not, as a rule, suitable; those employed for the match must be much more detailed.

Thus, the practicability of water courses and of all the obstacles which the terrain presents should be either indicated on the map or explained by reference notes.

The representation of cover, especially villages, ought to be made with the greatest care, even in the smallest details,

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so that the drawing itself is sufficient to give an idea of their power of resistance. For villages, special attention is required in the representation of outskirts, and of the character of construction of the buildings and inclosures.

The drawings should indicate very clearly the nature of the forests and of the cuttings made, so that one can determine at a glance their practicability and the strength of resistance which their borders offer. All of the accidents of ground which can be utilized as cover for troops should be represented with particular care: thus, it will be necessary to indicate swells in the ground, small bluffs, the diameter and depth of depressions, ditches, dry ditches, and sunken roads.

PAWNS.—Pawns present no peculiarity. Observe, however, that Meckel allows the use of different pawns for the detachment game and for the other kinds of games; the tables accompanying the instructions explain them in detail.

He recommends, however, for the detachment game, that the numbering of the pawns be specially noted with a view to having a fixed order of battle, which permits the determination at any moment of the use of each body of troops.

He insists on this precaution: Never handle the pawns when not in use, for they will very quickly lose their color; until the very moment of placing them on the map, keep them in a pasteboard box, so divided that each kind of pawns will have a separate compartment.

SCALE OF DISTANCES.—The scale of distances serves to facilitate and regulate the movements of the troops on the map.

The unit of time, that is to say, the duration of the round, is fixed at two and one-half minutes in the detachment game, and at five minutes in the grand game. The speed with which the troops march under normal conditions is based on the regulation gait. A small apparatus, constructed according to these data, and consisting simply of a strip cut out of sheet brass, gives for the three arms and for each gait the distance passed over during a round, so that any change of position of the troops on the march may be represented with rapidity and exactness. The outfit for the game comprises also dividers and paper scales of distances.

ARROWS.—Arrows are an invention of Captain Meckel, and are of the form of a horseshoe nail; they are of two different lengths, indicating whether the distance passed over is at a walk or trot, during a round.

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They serve a double purpose: First, to indicate that a troop is on the march, for which purpose the head of the nail is placed against a pawn, and the direction of the march indicated by the point; second, to show the point the troops will reach during the next round, whether it move at a walk or trot; in case the movement is executed at a gallop, two of the large-sized arrows are placed end to end.

DICE.—The umpire may base his decision either entirely upon tactical considerations, or he may resort to the use of dice for that purpose. The first method is certainly the most advantageous, because it does not retard the progress of the game; and the leaders, knowing that the element of chance will never influence decisions (and yet chance would produce a certain degree of interest at times), will never depart from tactical principles.

Directing the game in this manner with freedom is easy when the umpire has, by reason of his rank or recognized ability, such authority that his decisions will be received with respect, and his observations and explanations are awaited and desired by all the players; but such umpires are not found everywhere. It is necessary then to resort to dice, and we may remark by the way, that in general it is easier to accept the brutal decision of chance than one proceeding from reasoning, be it never so just. Besides, in many cases where chances appear equal for both sides, the die will be the only means of relieving an embarrassing situation; its use, too, will introduce to a certain extent the element of chance, the influence of which, we must admit, plays so great a rôle in war.

Meckel recommends the use of six dice, the different faces of which, numbered like ordinary dice, are painted in white, red, and black. The white faces are neuter, and are used only because they allow a variable ratio to be established between the red and the black. These, in conformity with their number, represent the expression of ratios 1 to 1, 1 to 2, 1 to 3, 1 to 4, 1 to 5, and 2 to 3, and serve according to the rules to determine favorable or unfavorable chances. Thus, after examining the tactical situation, if the umpire thinks the chances of a side are only 1 against 2, he will employ die No. III. The faces 1 and 4, red, are favorable; the faces 2, 3, 5, and 6, black, are unfavorable to the side which has only 1 chance against 2.

The die is thrown. If a red face is up, it indicates a favorable result; any other face, an unfavorable one.

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The dice serve as well to determine the losses occasioned by fire.

TABLES OF LOSSES.—The effect of fire ought to be the basis of the umpire's decision. It is necessary to be able to estimate it and take it into account during the entire course of the match.

The factors which should enter into its calculations are: The tactical situation and the morale of the troops delivering the fire, the nature of the target against which it is directed, and, finally, the range. By combining these known quantities with the five different values which he uses to estimate the efficacy of the fire (values which are subdivided three times, thus making fifteen combinations), and adding thereto the use of dice, the desired elements are obtained for finding in the tables the figures required to calculate the losses.

There are two of these tables: One gives the results which one-third of a company of infantry (a platoon) can obtain at different ranges by firing during a round (two and one-half minutes); the other gives the same information for the fire of two pieces of artillery under the same conditions.

By adding together the points thus obtained the losses can be estimated, allowing 60 points to represent one-third of a company of infantry or of a squadron, or two pieces of artillery. The losses should be calculated for each organic unit, company, squadron, or battery, as well as for all detachments operating separately.

The umpire could not be charged with this work, without greatly delaying the progress of the match; hence, he has an assistant to make the calculations and keep a record of the losses according to the accepted decision. But it is understood that the calculation of the losses is not absolutely necessary in the detachment game; it is a special study which has the advantage of allowing, in addition, an estimate of the expenditure of ammunition.

PROGRESS OF THE MATCH.—We know already that the umpire has an assistant; but he requires two assistants if the match is not conducted on a single map in the presence of all the players. As to the leaders, they may be alone, or assisted by other officers, to whom they intrust the command of troops as subordinates. No more than ten officers are required on each side.

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The match may be played on a single map, which is the usual method in the grand game or that of the detachment; or, else, the sides may act separately, which is the method employed for the strategic game.

THE TACTICAL WAR GAME.—Each side receives the hypothesis and its own theme, enunciated in conformity with all the precepts set forth in the "Études sur le Jeu de la guerre."

With the exception of night attacks, all the varied and numerous circumstances attending war can be studied.

The strength of the force to employ depends entirely upon the object to be accomplished. As a general rule, for the detachment game, it is not necessary to exceed one or two battalions of infantry, with the proper proportion of cavalry and artillery; but if it be desired to study in detail the effects of fire, not more than one battalion should be used; and for the grand game, the maximum limit is fixed at one division.

In making out their orders the leaders should not have the detailed map of the game; they must use the general staff map, the only one they would have in a campaign. The orders are transmitted in writing to the umpire, to establish the initial situation, and, these preliminaries ended, all assemble and the game begins.

It is useful to put at the disposal of the leaders maps to a scale of $\frac{1}{25000}$ or $\frac{1}{50000}$, so they can follow the operations up to the moment when all gather around the detailed map.

When the leaders have their subordinates in good position, the umpire communicates to them any knowledge he deems necessary, gained either by reconnaissance or from any other source. This enables him to exert a powerful influence on the general conduct of the match, and to this alone he should confine himself if he would carefully avoid directly interfering with the leaders and influencing the plans which they adopt.

The sides should receive only the number of pawns corresponding to their numerical strength; a good plan is to not give them, at the outset, the pawns representing the bodies of troops deployed as skirmishers, but to wait until the moment of deployment, and then exchange the ordinary pawns for them. This avoids having on the map an indefinite lot of pawns bearing no relation to the numbers employed.

When the march of approach is completed, and the leading troops of each side become visible and a battle is imminent, the umpire causes to be placed on the detailed map all the troops visible to both sides, and these only.

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The preparatory work is ended and the map maneuvering begins.

The umpire announces the first round, his assistant notes the time, and the match develops round by round.

The sequence of operations during a round is as follows: Placing of the pawns representing the new disposition of the troops, determination of the effects of fire, decisions based upon the effects; then orders are given, all the information obtained by reconnaissance is furnished and the leaders acquaint the umpire with the movements of troops which do not appear on the map.

It is thoroughly understood that all communications should be given to the umpire by each leader in such a manner that his adversary can not hear them.

In critical or decisive moments, the duration of the round, two and one-half minutes, may be subdivided into periods as short as desired to facilitate the study of a detail.

The orders of a leader to his subordinates should always pass through the umpire, who delivers them to the person addressed when the time necessary for their transmission has elapsed. The same rule is observed in regard to information. It is absolutely necessary that the movements of troops not visible on the detailed map be closely watched, in order to avoid improbabilities; the umpire's assistant may be charged with representing them on a special map. All decisions of the umpire are executory, and should be accepted without discussion, which is authorized only after the termination of the match. But a player is always allowed, when a decision is rendered, to call attention to advantages which may have escaped the umpire, or which he believes had not been sufficiently considered.

The greater part of the umpire's decisions will bear upon the following points:

(*a*) On the power of resistance of troops on the march and in fatigues, on the duration and rapidity of movements during an action, and on the cohesiveness which troops maintain in critical or difficult situations;

(*b*) On the value and practicability of the cover presented by the terrain;

(*c*) On the operations of the service of reconnaissance, and the information which it is able to transmit;

(*d*) On the results of a secondary conflict, the influence it may exert on the duration and issue of the general engagement, and upon the consequent situation as it affects the two sides.

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It is not possible to give rules to govern the umpire in all the numerous and different cases which can arise; his tactical knowledge will be his only guide. As soon as he sees that the action is sufficiently advanced to be instructive, and the objects sought by the two adversaries are clearly indicated, he may stop the match. The game ought to be managed so as not to last more than two or two and a half hours, in order to allow sufficient time for discussion, which should be conducted in the manner prescribed by the "Études sur le Jeu de la guerre."

THE GRAND GAME.—The rules of play are the same, but owing to the larger force employed, the battle can not be studied so much in detail.

THE STRATEGICAL GAME.—The strategical game deals with the functions and knowledge of the general staff officer. It enables him to study the preparation of orders for marches, cantonments, and bivouacs, for battle, outpost, and reconnaissance duty, etc. Besides, it can be advantageously employed to study all the "services," intendance, medical department, and telegraphs, especially as applied to service in rear of the army and on the line of communications. It is equally useful, too, for studying concentration of troops and their strategical deployment.

It is naturally out of the question, during the progress of a match in this form of the game, to assemble around one and the same map all the officers that are taking part in the operations. The parties work separately, reducing everything to writing, in three rooms, one being reserved for the umpire. This official controls the progress of the match by giving such information as may cause the operations to develop in a normal fashion.

Battles are not generally studied in detail; it is sufficient to indicate only their general features, and the umpire's decisions are rendered only to determine their influence on subsequent operations.

Rules, or even directions, are out of the question; besides, the strategic game is on the whole the same as a staff journey, only executed under different conditions.

Meckel concludes by laying stress upon the difficulties attending the functions of the umpire, not only from the tactical knowledge required, but also on account of the observations

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he is called upon to make in the course of discussion. He will have to show a great deal of tact and carefully avoid wounding the sensibilities of anyone, or else hard feelings will be engendered, the immediate result of which would be to render his functions very difficult, if not impossible.

Such is, in outline, the system approved by Captain Meckel for playing the war game. He had realized that so long as it was played even according to the improved method devised by Reisswitz it could not readily become a tactical exercise. It could not be such where the application of all the rules which restrained the leader and umpire played such an important part, and where the mechanical part of the game, so to speak, was of more importance than the tactical part, which latter should be the only consideration and sole object of those who participate in it.

In his studies on the war game Meckel had advocated the independence of the umpire, based solely on tactical considerations. In his instructions he dare no longer be so pronounced; while recognizing freedom in umpiring as the only true method, he allows it only when the rank or personality of the umpire endow him with such superiority that everybody is forced to accept his decision without discussion. In every other case, and apparently to introduce the element of chance to a certain extent, he advises the use of dice as a basis of all decisions.

The effects of fire play such an important rôle in the game that they can not be neglected, but as he proposes quite complicated rules for calculating the losses, which the umpire must study, there is entailed for him a greater or less loss of time in the course of the match. It is but just to observe, however, that he advises the employment of them only for a very small force.

He has seen fit to preserve the old method of dividing the game into rounds of a fixed duration. His instruction was to be followed by a second part, giving the application of his rules in concrete cases; but, as we have already said, he abandoned it after the publication, in 1876, of the brochure by Colonel von Verdy du Vernois—"Études Complémentaires sur le Jeu de la guerre."*

*An effort to simplify the war game, by Verdy du Vernois; translated by Morhange, 1877. Brussels, Muquardt; Paris, Dumaine.

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PROCEDURE RECOMMENDED BY COLONEL VON VERDY DU VERNOIS.

No more rules, not even directions; the umpiring absolutely untrammeled, resting only on tactical considerations; the battle studied by rounds, the duration of which to depend solely upon the actual duration of interesting stages of a battle. Such are the salient features of the new method, as set forth by the author in the exposition of a concrete case, preceded by a very short preface.

He commences by saying that the incontestable usefulness of the war game is to-day generally recognized and appreciated; nevertheless, every day witnesses efforts abandoned when they are scarcely begun. The question arises, Why is the war game not more generally practiced? The most frequent reply is, "We have no one who knows how to direct it suitably."

Evidently the management of the game requires a knowledge of the tactics of the different arms, as well as of their power of resistance; but the preliminary instruction of officers will have given them a foundation for this knowledge; practicing the war game will develop and strengthen it. In maneuvers every field officer, above and including the grade of major, may find himself in command of a detachment composed of the three arms. It is therefore indispensable that these officers prepare themselves in advance for such emergencies by applying themselves to the solution of the problems which the war game affords them.

Let us admit, for an instant, that the military instruction of young officers sometimes presents certain blanks, and that the decisions of the umpire, even, are not always beyond criticism; but do not such things happen in every military operation? We know they frequently occur in the field with well-trained troops. It is not, then, in the preceding reasons that we must seek the causes of the failure of the war game, but rather in the numberless difficulties which beset beginners in handling the tables of decisions, tables of losses, etc.

The game will be just so much the more useful as it is stripped of all this absolutely needless balderdash. The war game must be directed like a staff journey, in which the umpire renders his decision, based solely upon his own ideas.

Colonel von Verdy du Vernois does not pretend that the method he recommends is the only good one.

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He admits that according to the object sought one may employ either the strategical game or the old game as taught until now, with all its rules, dice, and tables, or the simplified game, using only maps and pawns without any other paraphernalia.

Every meeting of officers will choose the method which suits it best. Moreover, whichever one be adopted, its value will always depend upon the aptitude and military ability of the umpire.

Then, after this preface, follows an example of a detachment game, in which the author shows the application of his method to a concrete case. This example can not be outlined; it would have to be recited in full. But we are going to indicate the general course of the game, and the method of execution employed by Colonel von Verdy du Vernois.

Note at once that the course of the match follows, in a general way, the ideas expressed by Meckel, with the exception of the division of the game into rounds of a fixed duration and the employment of dice and tables of losses.

MANAGEMENT OF THE WAR GAME BY THE METHOD OF VERDY DU VERNOIS.

The execution of a war game requires—

First.—A detailed map, drawn to a scale of not less than $\frac{1}{8000}$.

Second.—A general map on a more reduced scale, say $\frac{1}{20000}$.

Third.—Some pawns made to the same scale as the detailed map; scales of distances, and dividers.

Before commencing the operation, the depth of the columns and rate of march for all the arms must be definitely fixed. For the latter, the distances should be stated in round numbers per minute. It is thoroughly understood that the umpire may change the conditions by declaring the troops more or less shaken, the roads bad, or by imagining any other cause calculated to influence the progress of the troops.

FORMULATING THE HYPOTHESIS.

The umpire prepares the hypothesis, and communicates it to the leaders a few days in advance or even on the day of the match. The former is preferable, because in reality the officer who, in time of war, is charged with any mission whatever, has more or less information concerning the situation.

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If the enunciation is not communicated until the last moment, there will invariably result a loss of time, during which the subordinates and spectators remain unoccupied.

It is better to communicate to the leaders the general hypothesis, as well as their own themes, in advance, for this will enable them to prepare the orders which the umpire must have to establish the initial situation of the match.

The hypothesis gives an outline of the general situation, setting forth what in reality each leader could know in reference to his adversary. The individual themes recite the exact composition of the forces, indicate the special mission of each leader and the officers who are to assist him. The umpire states also the exact day and hour the leaders are to transmit their orders to him, and if upon their receipt he is in need of additional information, he asks it of the leaders under the form of a memorandum. Rapidly executed sketches may also be useful to represent either an order of march or a network of outposts. The sketches when attached to a memorandum make it clearer and more easily understood.

The initial situation of the match can now be established by the umpire. He ought, whenever possible (but this is not absolutely necessary), to have an assistant to keep the notebooks (one for each side), measure distances on the map, make the necessary calculations relative to the marches, and, in a word, to have charge of the material and the mathematical part of the game.

Thus, as soon as the orders of the two leaders have been received and their purport determined by the umpire, the assistant writes on two separate sheets of paper the memoranda for the two sides, entering first what is required by the orders.

These tables of memoranda should contain the hours of departure; the formation and order of march of the different columns, so far as they are known; the names of places where these different columns begin the movement, and the names of officers who command the detachments.

OPENING OF THE MATCH.—After these preliminaries, which each one has arranged at home, all the participants assemble on the day appointed.

The place where the match is conducted should be arranged with two communicating rooms, so that each leader may be able to give his orders and instructions to his subordinates

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without being heard or inconvenienced by the opposing side. In one of the rooms the assistant to the umpire places the detailed maps, and in the other the general map. The umpire assembles all the officers and goes over the hypothesis; after which one of the two sides withdraws to the other room. The leaders communicate to their respective subordinates their own themes and the orders they have given, adding such instruction as they think necessary. Each commander then receives a number of pawns corresponding to the force and composition of his command; it is advisable, also, to give the commanders the different pawns representing the various formations their commands may take up; as, for example, to a battalion commander, pawns each representing a company, eight or ten pawns representing sections deployed as skirmishers, and others representing smaller fractions. This method is preferable to exchanging the pawns every time there is a change in formations, for it avoids a useless waste of time. The umpire must then allow a little time to both sides, so that officers who are not familiar with the hypothesis and their own themes and special missions, may study them and get their bearings on the map.

If there be not several of the maps showing the general scheme, the umpire should allow both sides to orient themselves on the detailed map.

If necessary, the umpire can at the same time be gathering any lacking information needed to establish the initial situation with exactness. The latter clearly fixed, the umpire will examine, without either side being allowed to see him (one of them being in a separate room and the other removed to a distance from the map), when and at what point the two sides will become visible to each other; this will be determined from the hours of departure and the distances covered by the troops, as indicated in the orders issued by the leaders. If, for example, the two sides can not become visible to each other before half past 6 o'clock, he will fix that time as the beginning of the operations. In the course of the match, he will determine in the same manner, using as a basis only the salient features of the operations or battle, the time which will correspond to any situation sufficiently interesting to warrant special study; the study of the battle will then be divided into phases, the duration of which depends solely upon the progress of the action.

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It is observed that Verdy du Vernois has abandoned the system of rounds of equal duration, and substituted therefor periods varying in duration according to the length of time necessary to reach an interesting point or a situation which merits especial notice. The duration of preliminary movements, or unimportant marches of approach, are taken into account only to calculate the time necessary for their execution.

EXECUTION OF THE GAME ON DETAILED MAPS.—One of the two sides (red, for example) occupying the separate room, the umpire calls the other (blue) near him.

All the officers comprising the "blues" may be called near the map at the same time, but the umpire should make it his business to see that none of them, except the one he addresses, gives his opinion or indicates any disposition to be made or orders to be given. He sees to it, also, that orders and reports are not delivered to the persons addressed until the very moment they would receive them in reality; that is to say, he must take into account the time necessary for their transmission.

He then reveals the initial situation at 6.30 o'clock, for example, to the "blues," and has placed upon the detailed map the pawns representing their forces, which, from what he has seen of the movements executed by the other party, will be seen by the "reds."

He directs the attention of the "blues" to what they themselves may see of the enemy, and directs the leader or leaders to think over what they will have to do. Then the "blues" quit the room and the "reds" enter, when the umpire goes over the work in the same manner for them; the red and blue pawns, representing the first troops in each other's presence, are now in position on the map.

The umpire then questions the two sides separately as to their intentions. He begins with the "reds," who are now with him, and he sees, for example, that it will be 6.34 o'clock when the measures which they wish to adopt will have been executed.

He then goes to the room where the "blues" are waiting, and asks what they would be doing during the same four minutes. Then he reunites the two sides around the map, shows the situation again, places in position such visible troops as will have changed position, or concealed troops that will have

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become visible, and gives such information as he deems proper. Then one of the sides withdraws; the umpire again questions the leaders separately, and sees, from their intentions, where and at what time the forces will meet (the side which remains in the same room with him withdrawing from the map, as before stated); he calculates the time required for the orders and information to reach the parties addressed, and then calls both sides around the map. He takes up the situation where he had left it, causes each subordinate commander to move his own pawns in conformity to the orders which they have previously communicated to him, and the exercise continues in the same manner until a solution is reached or the umpire sees fit to terminate the match.

All the decisions relative to the success or failure of an attack, to the possibility of continuing a march in advance or to the necessity of retreating, are based solely upon tactical considerations, the umpire viewing the effect of fire only from its possible effect upon the morale of the troops engaged. There are neither dice, tables of losses, nor lists of losses to be made out; the only records the assistant to the umpire keeps consist of notes of the time when important events occur, and of a concise summary of them.

We have been unable, as before stated, to give more than the general principles which regulate the course of the game; the method recommended by Verdy du Vernois not admitting of fixed rules, it is possible to analyze only the mechanical part. For those who wish to study the manner in which Verdy du Vernois applies his method in a concrete case, we direct particular attention to the closing paragraph of his work, in which he says:

"It will be noticed that the management of a war-game match is a great deal more simple and less complicated than appears at first sight on reading the example we present. The calculations of time, as set forth, become greatly simplified when the match is played with the map in sight. * * * Moreover, a large part of the observations indispensable here are not necessary in the true game; the commanders will no longer tell each time what their future projects are; the things done here to make the game more comprehensible are, for the most part, dispensed with in practice, because those interested, instead of communicating their intentions to the umpire, merely indicate them by moving the pawns on the map or by adding to them when new troops arrive upon the scene."

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This last transformation of the war game is the most radical. It is no longer a game, but a maneuver against an opponent, developing itself on the map, and kept by an umpire within the domain of tactical principles. All the difficulties attending the exercise pertain to the manner in which the functions of the umpire are performed, and adversaries of the game, seizing upon that fact, advance the argument that of course with an umpire as distinguished as Colonel von Verdy du Vernois, it can not help being interesting and instructive, but that it is very seldom that such a personality can be found. The objection is specious, for the exercise may be fruitful of results without being so brilliantly managed. The example so ably treated by Colonel von Verdy du Vernois proves that the functions of the umpire may be exercised in absolute independence of rules; no special preparation for them is necessary if one has good tactical knowledge, combined with the necessary aptitude and a taste for the game.

However, we shall take up the consideration of the management later on.

The works which we have just analyzed gave a new impetus everywhere to the study of the war game; we already know that it had acquired a firm footing in the armies of Russia, Switzerland, and Italy. In England, Captain Shaw, in 1877, modified the generally adopted method, by substituting for the map a representation of the terrain in relief to the large scale of $\frac{1}{720}$. The results obtained were so conclusive that the Duke of Cambridge, in an order dated October 23, 1883, officially introduced the war game into the English army.*

But the movement was more pronounced in Austria.

The "Organ der Militär-wissenschaftlichten Vereine" as early as 1876 contained instructions for the war game, which closely resembled the works of Meckel and Verdy du Vernois; and these instructions were, in 1883, rounded out by Colonel von Bilimek-Waissolm, who gave some examples of the method and of the management of the game.

In 1877, there appeared in the same publication a study by Captain Reitz, of the general staff, which treats of suitable themes, and in which he lays particular stress upon the absolute necessity of following a regular progression in the study of the war game, and of not attempting competitive maneuvers

* See "Revue Militaire de l'Étranger," first half year, 1884.

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with large forces until after having practiced with small ones, even without the enemy represented. Reisswitz had already pointed out the necessity of this in 1824.

Captain Reitz sought the means best calculated to secure progressive instruction, and expressed at the close of his article an idea at least original:

Why should not the exercise be used as well in studying the tactics of foreign armies? For example, one could study the combat of an Austrian with a Russian, or German, or French division. That would compel officers to become familiar with the organization, composition, armament, and the tactics employed by the units of the different arms. Here, too, it would be necessary to proceed from simple to more complicated problems by commencing, for example, with a combat between an Austrian and an Italian company; then the nationality could be changed, and the problem repeated, using a battalion, a squadron, etc.

In order that the war game may reach a maximum of utility, Reitz advises officers who desire to practice it to form a club and purchase the necessary outfit by a small assessment, and to choose at will an umpire to organize and manage the matches. According to him this method produces the best results.

Finally, in 1877 the *Organ* (first half year) contained an article by Major von Hugo Bilimek, of the general staff, on the war game as applied to the intendance service in the field. Assuming the principle that even during maneuvers officers of the intendance do not have the opportunity to prepare themselves for the rôle they are to play in war, he gives suggestions for exercises on the map, the direction and execution of which will be performed by officers of the general staff and of the intendance. We may cite also, in Germany, a paper on the regimental game by Captain Naumann, in which he gives a new method of playing the detachment game. This brochure contains principles of execution and their application to a concrete case. It proceeds, in its general features, along the lines laid down by Meckel, but gives a new basis for calculating the losses occasioned by infantry and artillery fire. The author remarks that these rules closely approach actual results, for by applying them to a situation analogous to that of the German regiments at the battle of Spicheren, the results obtained agree approximately with the losses of the regiments selected for comparison as given by the great general staff in their work on the war of 1870–71.

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Finally, efforts have been made in Germany to organize war-game societies among the officers of the reserve and of the landwehr, under the direction of the commandants of districts, who, in time of peace, have the authority of corps commanders over such officers within the limits of their jurisdiction.

* * * * * * *

To recount the different modifications which the war game has undergone, to describe the successive phases of its transformation from the game of chess to competitive maneuvering on the map—such was the object of this paper. We have sought to bring out the central idea which guided Lieutenant von Reisswitz and all his successors in their efforts to find a means of practical instruction which, without the cooperation of troops, would serve to improve the tactical education of officers.

The last form given to the game by Meckel and Verdy du Vernois seems to have solved the problem; and in different foreign armies competitive map maneuvering is either obligatory or so universally practiced that it may be considered part of the regulations.

In Austria the game is obligatory. Officers are required to take part twice a month during the winter season—that is, from the 1st of December to the end of March.

In Italy map maneuvering is made part of the professional examinations for the grade of captain and of field officer.

In Russia the exercise is practiced a great deal; and, finally, in Germany, although it is not required by regulations, there is not a single body of officers which does not have its war-game matches.

Everywhere, it has its enthusiastic supporters and consequently its detractors, but without doubt its worst enemies anywhere are those who are indifferent.

Even in Germany some authors of more or less humorous articles picture it as a hothouse plant, weakly vegetating in the officer's club, and existing only because superior authority insists upon it. Sometimes we are shown young lieutenants amusing themselves with the war-game dice during the progress of a match, instead of occupying their time with learned calculations to determine how much loss a skillfully unmasked battery has inflicted on an adversary; or pushing forward the hands of the clock so the game will sooner terminate. Occasionally, we have pictured a poor captain, who, charged

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with giving a very important order, can not prepare it quickly enough; the efforts he puts forth make the room entirely too hot for him; he seeks the refreshment of a few glasses of beer, and, in the end, under the sharp gaze of the umpire, his colonel, completely loses his head and finishes by swallowing his cigar, fire and all. During this time, the army corps and divisions are dancing a mad saraband on the map, the troops are marching 20 miles an hour so as to finish the job as soon as possible, and when the time arrives for a decision there are neither friends nor foes to be found; the action has been so hot, and the fire so murderous that everybody is killed.

The criticisms presented under this humorous form possess some truth. A German proverb says: "There is no one thing that suits everybody," and it should not be forgotten.

The war game has consequently given remarkable results in the voluntary clubs formed in garrison by the officers desiring to engage in this kind of study. Convinced of its importance, they have taken it up ardently, and in it find an energetic stimulant to mental occupation; for we must remember that the object of the exercise is not merely to learn to move pawns on a map with more or less skill, but to apply in a special well-defined case the information already acquired.

To this instruction must be added that which proceeds from the observations of the umpire, and this is the vital point of the exercise. According to the worth of the umpire, so is the value of the match. Verdy du Vernois had already touched lightly upon this point in 1876, and the question is always the same, to judge of it by the following remarks on an article which appeared in the *Militär Wochenblatt* in 1897:

Why do so many officers regard the war game as nothing but a drudgery, instead of according to it the importance which it merits? When they reach such a conclusion, it is because they know neither how to use nor how to manage it. Many officers pretend that these qualities are possessed by only a few privileged persons; of course they are wrong, but they gladly seize upon this as a reason for not paying more attention to it. To perform the functions of an umpire, no exceptional qualifications are necessary; all that is required is to render the exercise attractive and interesting. For that, one only need observe a few simple maxims: The most dangerous enemy to the war game is slowness; if the commencement of the match drags painfully, if all the preliminaries are scrutinized

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minutely down to the smallest details, if the cavalry screen is examined even to the very marching of the smallest patrols, hours pass before the match really begins, and the interest is already much diminished. It is necessary to examine in detail only the salient points, and generally these are not numerous. No single match ought to last more than three hours at most.

Every match should have a well-defined object, that is to say, have for its aim the demonstration of a special tactical problem. It is evident that at the outset it is best to begin with small, easy operations; but when, thanks to well-regulated progress, officers shall have acquired some experience, when the tactical lessons will have borne fruit, care must be exercised to avoid enunciating themes which always have the same general character, and to vary them so as to develop the spirit of decision in those who take part in the exercise.

The hypothesis and all orders must be prepared with the utmost care; and it is of the greatest importance that the initial situation be established as clearly and plainly as possible, for upon this the whole match depends.

The umpire should require the leaders to express their intentions in the form of orders, as this obviates indecision and loss of time. These orders will be only rarely given in the form prescribed by the umpire; and this limitation will operate to introduce the essential principles of noninterference in the development of the match. Certainly, the umpire should see to it that matters do not take a grotesque turn, though he ought carefully to avoid influencing the leaders or their subordinates for the purpose of developing a match according to his own ideas; because to do so would remove all freedom of action from the players, and quickly make them completely indifferent to the results of measures thus imposed upon them. Frequently, it is the adoption of unforeseen or even defective dispositions which give rise to the most interesting and instructive situations in the match.

Whatever may be the measures adopted, the umpire should permit them to be pursued to a conclusion, as the consequent results will be a better lesson than any criticism he would be able to make beforehand.

Besides, if the umpire is obliged to interfere, it is easy for him to do so through the medium of the directions he gives to each side. By so doing he imposes no restraint upon the player's freedom of action, and is able, nevertheless, to assure

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contact of the forces, without permitting any absolutely inadmissible conditions to arise; but he should never do anything which could be construed as an act of approval or disapproval. The leaders must have full responsibility, if interest in the game is to be maintained.

We speak of information: the umpire must carefully consider the wording of information which he sends, and, instead of making it too definite, always allow the element of uncertainty which exists in war. It will be well, also, before the commencement of the match, to give all the indications as to the season of the year during which the operations are supposed to be carried on, as to atmospheric conditions, the practicability of the roads, forests, water courses, character of buildings, etc.

Finally, in the discussion, the greatest tact should be used carefully to avoid any hard feelings. Comparing orders with results attained, and cause with effect, will serve the best purpose, for by this means criticisms may be made in detail, without engaging in personalities.

To sum up, the war game should be short, animated, proceed rapidly, and not present too great a study of details; if the umpire, moreover, allows the leaders complete freedom of action, it will be interesting and instructive. The difficulties, then, which attend its management are not insurmountable.

Such is the advice given for the umpire by a partisan of the war game.

In conclusion, permit us to ask the following question: Does the exercise offer all the advantages which Meckel claims for it? That would perhaps be asking a great deal of it, but in all cases it may be asserted that it is a most useful exercise, because it develops in the officer a taste for study, appeals to his intelligence rather than to his memory in the study of tactical problems and concrete cases, which are always interesting and instructive, and promotes in him a spirit of decision which in war is the master talent of a commander.

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A COMPARATIVE EXAMINATION

OF

THE WAR BUDGETS OF FRANCE AND GERMANY

FOR 1897.

TRANSLATED FROM THE FRENCH

BY SECOND LIEUT. GEORGE BLAKELY, SECOND U. S. ARTILLERY.

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A COMPARATIVE EXAMINATION

OF

THE WAR BUDGETS OF FRANCE AND GERMANY FOR 1897.*

From a simple examination of the figures in the war budgets of various nations, it is very difficult to form an exact idea of the extent of the outlay for military purposes, or of the partition of this expense among the different branches of the military service. The difficulty is increased when the figures for different items of expense are compared.

Thus, in France, certain receipts are turned into the treasury, while in Germany they are deducted from the corresponding expenses. This is notably the case in the purchase of horses. In France any proceeds in this department are deposited in the treasury, while in Germany the budget shows only the difference between the receipts and expenditure in this service. In France, likewise, the budget includes 46,382,800 francs for the gendarmerie (military police), while in Germany the expenses under this head are accounted for in the special budgets of the States.

However, in default of a more exact basis of comparison, we may, by a detailed examination of the appropriations in the two countries and of the questions raised in the course of debate on the budget, form some idea of the tendencies that manifest themselves in the army as well as in the national assemblies.

The sums voted by the legislature in France are as follows;

	Francs.
Ordinary expenditure	598,253,897
Extra expenditure	24,297,500
Total	622,551,397

*Based on the Report of the Committee on the French War Budget and on discussions in the legislative chambers.

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Adding to this the military expenses in the budget of the Minister of Finance, such as the pensions (93,404,000 francs), the annuity corresponding to the loan of the extra budget (110,000,000 francs), and certain other expenses, the total cost of the army exceeds 846,000,000 francs.

In Germany the war budget for the fiscal year 1896–97 is as follows:

	Francs.
Ordinary expenditure	598,842,521
Extra expenditure	78,041,957
Total	676,884,478

From investigations of the committee on the French budget (the details would be of little interest to readers of the *Bulletin*), it follows that if the French and German budgets were drawn up under similar condition the ordinary expenditure would amount to 519,000,000 francs in France and 601,992,521 francs in Germany. These figures represent what may be called comparable budgets.

It is also to be remarked that the total extra expenditure in France from 1872 to 1897 amounts to 3,124,833,062 francs and in Germany to 3,610,771,895 francs.

The table that follows shows the strength of the military forces that served as the basis of the budget estimates:

FRANCE.

Arm or service.	Officers.	Men.	Remarks.
General staff	3,773	821	In 1896 the total number of noncommissioned officers above the rank of corporal (sous-officier) was 39,518, of whom 15,946 were reenlisted.
Military schools	397	2,807	
Unclassed with the troops	2,352	471	
Infantry	12,967	353,247	
Administrative	----------	15,893	
Cavalry	3,937	73,669	
Artillery	3,947	77,952	
Engineers	475	12,807	
Train	412	10,926	
Total	28,260	548,599	
Gendarmerie and Republican Guard	740	25,121	
Grand total	29,000	573,720	141,798 horses.

These figures give the gross aggregate strength.

The net strength, or the gross strength diminished by the number absent (on furlough, sick, etc.), is estimated at 28,063

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officers, including 1,281 surgeons and 3,829 officers of the administrative branches (functionnaires et employés militaires); the net strength of enlisted men is estimated at 504,931, exclusive of the gendarmerie.

Taking another view, the itemized returns from the units of the army gave the following as the strength after July 1, 1896, exclusive of the gendarmerie:

Men called for one year	62,662
Men called for two or three years	372,375
Men of the permanent force (enlisted, reenlisted, foreign, military prisoners, and men whose time has expired, but are still permitted to serve with the colors)	115,567
Total	*650,604

Of this total, the men serving for two years may be estimated at about 18,000.

The total of 28,250 officers and 548,599 men for the year 1897, in the table of the gross strength, is an increase over the budget estimate for 1896 of 37 officers and 8,476 men.

The report of the French committee shows the following strength for the German army:

First—

Officers, 22,687; surgeons, 2,090, of whom 677 are under-surgeons who have the rank of noncommissioned officers and receive the allowances of assistant surgeons; administrative officers, 3,593. Total, 28,370.

Second—Enlisted men.

*The sum is, correctly, 550,604.—TRANSLATOR.

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TABLE OF COMPARISON WITH THE STRENGTH OF THE FRENCH FORCES.

	GROSS STRENGTH.							NET STRENGTH.			
	GERMANY.				France.*	DIFFERENCE FOR FRANCE.		Germany.	France.	DIFFERENCE FOR FRANCE.	
	Men included in the law of the quinquennat (1893).	Volunteers for a year.	Gunsmiths, saddlers, veterinaries.	Total.		Greater.	Less.			Greater.	Less.
Infantry	371,570	6,640	724	378,934	352,619	------	26,315	364,360	324,411	------	39,949
Cavalry	65,084	1,260	413	66,757	73,276	6,519	------	64,189	67,417	3,226	------
Field artillery	57,404	1,120	273	58,795	63,540	4,745	------	56,537	58,457	1,920	------
Foot artillery	22,189	449	37	22,675	14,220	------	8,455	21,803	13,083	------	8,720
Engineers	19,085	260	31	19,376	12,782	------	6,594	18,631	11,761	------	6,870
Train	7,654	189	21	7,864	10,903	3,039	------	7,562	10,032	2,470	------
Administrative schools, various formations	14,297	------	†3,286	17,583	21,259	3,676	------	16,907	19,772	2,865	------
Total	527,283	9,918	4,785	571,984	548,599	17,979	41,364	549,989	504,931	10,481	55,539
	Less for France					23,385				45,058	

* The differences between the numbers here and in the preceding table are due to the fact that the headings and classes are not the same. Certain figures have been modified to permit a comparison.
† Attached to arsenals.

According to the report of the committee on the French budget of 1895, the troops of Algeria and Tunis number 62,000 men. Subtracting this from the net strength, 504,931 men, there remain 442,931 as the force that France maintains on the continent, against 549,989 maintained by Germany, making a total difference of 107,058 men in favor of the latter country.

The French army possesses 141,798 horses, counting those of the gendarmerie; the German army has 120,856 horses.

Calculating on the basis of net strength and using the budgets as adjusted for comparison, we obtain as the mean expense per man present in the ranks:

In France, 519,000,000 ÷ 504,931 = 1,027.86 francs; and in Germany, 601,992,521 ÷ 549,989 = 1,094.55 francs.

If we used the ordinary budget and the net strength, the figures would be:

For France, 598,253,897 francs, less 46,382,800 francs (for the gendarmerie), or 551,871,097 francs, divided by 504,931, giving 1,092.96 francs; and

For Germany, 598,842,521 francs ÷ 549,989 = 1,088.83 francs.

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In France, according to the report of the committee on the budget, the annual cost of the soldier is as follows:

	Mounted soldiers.	Foot soldiers.
	Francs.	*Francs.*
Pay	109.50	102.20
Allowance accompanying pay, (meat, etc.)	103.811	103.811
Food, (bread)	95.613	95.613
Hospital, (average cost)	15.00	15.00
Clothing	109.50	83.95
Bed furnishings	5.385	5.385
Total	*439.809	405.959

*The correct sum is 438.809. The numbers in this table were carelessly entered in the original. Obvious errors have been corrected.—TRANSLATOR.

For a noncommissioned officer above corporal when not reenlisted, the annual cost varies from 654 francs to 1,253.09 according to rank and arm of service (foot soldiers or mounted); for the reenlisted noncommissioned officer, the cost varies from 1,488.56 to 2,329.95 francs.

The regulations concerning the soldiers' mess, allowances in kind and bedding, present marked differences in the two countries.

In France, the daily pay of the foot soldier is 0.28 franc; that of the mounted soldier, 0.30 franc. From this is deducted about 0.23 franc for the cost of the mess. The soldier receives besides 0.750 kilogram of bread and 0.300 kilogram of meat. The meat is purchased by the mess, which receives on this account an equivalent that varies in the different garrisons, and averages about 0.341 franc a day. The clothing fund* (la masse d'habillement) furnishes cleaning materials.

In Germany, the daily pay of the soldier is 0.4375 franc for foot troops and 0.50 franc for mounted troops. The soldier is allowed besides a compensation for additional expense of food, varying with the garrison, but averaging about 0.15 franc a day for each man. A deduction is made from these

La masse d'habillement, la masse de casernement, etc., are special funds transferred to an organization by the Government to meet the expenses under the respective heads of clothing, barracks and quarters, etc.—TRANSLATOR.

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allowances of 0.3775 franc for food and 0.01 franc a day for cleaning materials. He receives, like the French soldier, 0.750 kilogram of bread, but is not furnished with meat by the Government; this is bought at the expense of the mess.

In France, the soldier eats only wheaten bread, and receives a warm meal every morning and evening. In Germany, rye bread is chiefly used; the soldier has a right only to the mid-day meal, and must procure his evening repast with the pay that remains over. He receives for bedding only a straw sack, a bolster, and a pair of sheets; in France, a mattress is supplied to each soldier.—(Rapport de la commission du budget en 1892.)

With reference to the number of units of organization in the two armies, it is to be remarked that the laws of 1887 and 1893, creating new units in the French army, have not as yet been fully carried out; there still remain two regiments of cavalry and nine batteries of heavy artillery to be organized.*

Supposing this organization accomplished in France and the transformation of the fourth semibattalion completed in Germany, we have the following comparative table of units in the active army:

Arm or service.	France.	Germany.
Infantry (companies)	2,427	2,496
Cavalry (squadrons)	456	465
Field artillery (batteries)	512	500
Foot artillery (batteries)	108	152
Engineers (companies)	95	124
Train (companies)	72	65

According to the law fixing the organization, a French company should contain 175 noncommissioned officers and men in the infantry regiments as their reenforced total strength; as their normal strength, an infantry company should contain 125 men, and the companies of the Chasseur battalions 150 men. In Germany a company numbers 170 men in the regiment reenforced, and 147 to 156 men in the regiment at its normal strength.

It is to be observed that the actual strength of the units is very variable in France, while in Germany it is all but absolutely fixed, vacancies being filled by the Nach-Ersatz.†

* See the *Bulletin* for January 15, 1895, No. 256, pp. 74 and 92.

† See the *Bulletin* for January 15, 1895, No. 256, pp. 24–48.

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Before the law of 1893, the men of this complement to the contingent were only called as vacancies occurred; but these successive calls have been abandoned on account of the great inconvenience they presented in the way of instruction. At present, men of the Nach-Ersatz are embodied at the same time as the rest, so that besides the stipulated normal contingent each unit receives a certain number of men (from 5 to 6 per cent of the contingent) to supply losses that occur.

This complement in recruiting does not exist in France. The size of the units, and the large number of young men who take advantage of the exemptions provided by the law of 1889 and are not obliged to serve more than a year, force the government, in order to obtain the legal strength on a peace footing, to incorporate in the active army the entire number of men fit for service.

The recruiting resources of France allowed the incorporation in November, 1896 (class of 1895) of 224,000 men, of whom 156,000 were for two and three years, and 68,000 were for one year. There remained over about 20,000 men not fitted for active service, who were classed in the auxiliary services, where they will receive no instruction in time of peace.

In Germany, on the other hand, after subtracting the number of men necessary for the active army (on an average 223,000), the recruiting resources permit the assignment of 100,000 men in round numbers to the first ban of the landsturm and 80,000 men to the recruitment reserve. These last are all in a greater or less degree fitted for active service, and 12,500 of them are designated each year to receive military instruction, amounting in all to twenty weeks distributed through three years.*

In the German army, with the exception of the volunteers for a year (about 10,000), all those called serve in the active army for two and three years; in the French army about 30 per cent of the annual contingent serve but a single year, or, rather, ten months. These last, to a large extent, are embodied in the infantry regiments of the interior, of which 50 per cent of the strength is thus renewed every year. Besides this fact, the legal strength of these regiments is rarely attained, since there is no complement to the recruitment.

*See the *Bulletin* for October 31, 1896, No. 299, p. 407.

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The report of the French committee on the budget for 1897, from which the preceding information has been obtained, contains also a study in detail of the organization and operation of the *masses* in France and in Germany.

The growth of the forces maintained, and the frequent changing of the men with the colors, led inevitably to abandoning accounts with the individual, just as the reduction in the time of service led to the substitution of the regiment for the soldier in the ownership of property, so as best to subserve the interests of the treasury.

The order of the 16th of November, 1887, creating the present clothing and repair fund (masse d'habillement d'entretien), has effected savings which may be estimated at more than 7,000,000 of francs a year.

The fuel fund (masse de chauffage), based on the principle of direct purchase by the units of organization with money allotted them, has likewise been in operation since September 27, 1887.

Since the establishment of this new *masse* the yearly saving has been more than 550,000 francs. Similarly the school fund and saddlery fund (les masses des écoles et du harnachement), administered by the units, have saved the treasury annually 350,000 and 150,000 francs, respectively. The saddlery fund has been established but a year, and much more is expected of it.

Finally the barracks and quarters fund (masse de casernement), administered by the organizations, has in a large degree reduced the total cost of maintenance in barracks.

As a result of the new system, company commanders have had added to their regular duties the charge of administering their portion of the fund, as well as the care of the company stores. These new functions have imposed on them a heavy administrative task, which tends to distract them from their work as instructors and to keep them away from the drill ground. On account of strong complaints in this matter, the minister has just ordered a board to assemble for the purpose of examining this question, and to propose measures for reducing the obligations and responsibilities of company commanders.

To sum the matter up, the French military administration transfers from itself to the units of organization, the care of performing the greater part of the administrative work, making them daily, monthly, or yearly allotments. Thus there is a

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return to the military system of former times, when the heads of units, who recruited their own men, received a fixed sum to maintain a definite force. There is this great difference, however, that more precise regulations and more detailed proofs have substituted the interest of the soldier for that of the colonel or captain.

Though based on similar principles, the working of the *masses* in Germany presents nevertheless some important differences from the French system, which it may be well to point out.

As regards the supply of clothing, the French units receive the greater part of this clothing made up, from the administrative depots, which are the intermediaries between those who furnish the fabric and who make it up on the one hand and the units of organization on the other. The money allotted to the clothing fund is estimated from the aggregate force present, and no period is stated for which the goods are to last.

In Germany, as a rule, the regiments receive from the depot of the army corps only cloth, new shoes, and leather necessary for repairs. Clothing and equipment are manufactured in these depots only so far as the capacity of the workshops admit, and in the proportion fixed by the corps commander. As a rule, the material is made up in the regiments by workmen without rank, under the direction of skilled workmen, and also by soldiers' wives.

The money allotted to the clothing fund is calculated on the basis of the regulation strength, unless a reduction of this strength has been ordered by the minister of war for a period of not less than six months. The allotments are likewise based on the time that each object will last; that is, there is given each year the total value of goods that should last a year, or a half or third of a year, and so on, and also of such as should last two or three years, or more. The savings realized constitute a reserve fund for the organization. This fund is used first of all to improve the field clothing kept in store, and after that to repair the clothing already issued to the men.

The question of telegraphic communication has also been raised in France this year in the discussion of the budget.

Apart from the light telegraphic organization in each cavalry regiment, consisting of a group of four mounted telegraphers and cyclists, the telegraph service in France does not

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embrace, as in most of the other powers, a special body organized in time of peace.

The postal and telegraphic administration of the country places at the disposal of the minister of war a certain number of its agents to be taken into military service at the moment of mobilization. A part of this personnel is called together each year at certain schools of instruction to be practiced in constructing field lines, establishing stations, etc.; and complete sections are organized to take part in the army corps maneuvers.

It was hoped by this system that the expense would be considerably cut down, but the fact is, that the running of the department schools, the annual mobilization of one or more sections, and the keeping of muster rolls cost the budget over 160,000 francs. More than this, the postal and telegraphic administration has avowed itself unable to assure telegraphic service for the army and at the same time for the fortresses and the interior. For the service of the first line (the field of operations), it can furnish but 2,561 managers, operators, and workmen, and it requires for the service of the interior, 2,528 soldiers from the active army and 1,393 men from the territorial army.

The committee's report points out this situation, and proposes to add to the railroad regiment a special battalion of four or five companies of telegraph operators. To add this battalion would involve an expense of from 70,000 to 80,000 francs, a sum one-half of what the present organization requires.

The Minister of War has announced to the Chamber that he has directed General Niox, inspector of military telegraphy, and General Laurent, chief of engineers, to prepare a scheme for the reorganization of the military telegraphic system.

The need of a special body of telegraph operators has likewise been felt in Germany,* and the fifth company of the battalion of pioneers of the Guard (the other battalions have but four companies) has just been converted into an independent unit, called the "telegraph company." Hitherto the telegraphic service has been performed by a number of sections formed in some of the pioneer battalions.

In this connection, we will note by the way, that Austria has one company of telegraph operators, constituting a part

* See the *Bulletin* of January 31, 1897, No. 305, p. 87.

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of the railroad regiment; Italy has one regiment of telegraphers, consisting of 12 companies; Spain has one battalion of 4 companies; Russia, 16 companies; England, one battalion; Switzerland, 4 companies; and Holland, 1 company.

The question of firing ranges and drill grounds has also been raised in France, and a sum of 2,000,000 francs is in the budget of 1897 under the heading, "Drill grounds, firing ranges, and riding schools."

In France the different departments occupied by army corps, with the exception of four, have firing grounds for artillery, but only the camp at Châlons approaches the German firing grounds in dimensions. This year, for the first time, at Châlons, a brigade of infantry and a regiment of cavalry will cooperate in the maneuvers of masses of artillery.*

In Germany, from 1874 to 1891, 26,000,000 francs have been spent on firing ranges; from 1891 to 1896—the period of perfecting the arms—60,000,000 francs have been applied to the same object, and the budget of 1896–97 provides an additional sum of 11,000,000, making a total of 97,000,000 francs.

At a time not very distant, each German army corps will have its own practice grounds. The following table of existing firing grounds shows that some of them have attained considerable size:

Locality.	Corps.	Area.	Locality.	Corps.	Area.
		Sq. kilometers.			*Sq. kilometers.*
Loburg	IV	50	Doeberitz	Guard.	48
Munster	X	47	Thorn	XVII	44
Munsingen	XIII	37	Elsenban	VIII	35
Juterbogk	III	33	Senne	VII	33
Hammelburg	II. Bav.	30	Arys	I	25
Wahn	VIII	23	Lockstedt	IX	22
Lechfeld	II. Bav.	20	Hämmerstein	XVII	18
Zeitbain	XII	15	Gruppe	XVII	12
Lamsdorf	VI	11	Wesel	VII	10
Haguenau	XV	9	Darmstadt	XI	4

The German budget for 1896–97 indicates the establishment of firing grounds for the V. Corps and the enlargement of those of Arys, Lockstedt, Lechfeld, and Zeitbain.

It will be seen that the budget provides for judicious modifications. Decentralization is a characteristic feature in France, and the result would seem to benefit the soldier as well as protect the interests of the treasury.

*See the *Bulletin* for February 28, 1897, No. 307, p. 195.

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